# DL750/DL750P
## ScopeCorder
# OPERATION GUIDE

YOKOGAWA
Yokogawa Meters & Instruments Corporation

IM 701210-07E
3rd Edition

# Foreword

Thank you for purchasing the DL750/DL750P ScopeCorder.
The purpose of this operation guide is to familiarize the first-time user with the basic operations of the DL750/DL750P. The guide primarily focuses on the basic operations of the DL750.
There are additional user's manuals for the DL750. The DL750/DL750P User's Manual Part 1 (IM701210-05E) and DL750/DL750P User's Manual Part 2 (IM701210-06E) explain all the functions of the ScopeCorder. The DL750/DL750P Communication Interface User's Manual (IM701210-18E on CD-ROM) details the communication functions. Read these manuals along with this operation guide.

# Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions. The figures given in this manual may differ from those that appear in the actual screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
- Copying or reproducing all or any part of the contents of this manual without the permission of Yokogawa Electric Corporation is strictly prohibited.
- The TCP/IP software of this product and the document concerning the TCP/IP software have been developed/created by YOKOGAWA based on the BSD Networking Software, Release 1 that has been licensed from the University of California.

# Trademarks

- Adobe, Acrobat, and PostScript are trademarks of Adobe Systems Incorporated.
- Zip is either a registered trademark or trademark of Iomega Corporation in the United States and/or other countries.
- For purposes of this manual, the TM and ® symbols do not accompany their respective trademark names or registered trademark names.
- Other company and product names are trademarks or registered trademarks of their respective companies.

# Revisions

| | |
|---|---|
| 1st Edition | February 2005 |
| 2nd Edition | May 2005 |
| 3rd Edition | December 2005 |

3rd Edition : December 2005 (YK)
All Rights Reserved, Copyright © 2005 Yokogawa Electric Corporation

# Contents


**Foreword ..... 1**

**Flow of DL750/DL750P Operation ..... 3**

**Front Panel Controls ..... 4**

**Parts of the Screen ..... 6**

**Basic Key & Jog Shuttle Operations ..... 8**

**Main Functions of the DL750/DL750P ..... 10**

**Operating the DL750/DL750P ..... 16**

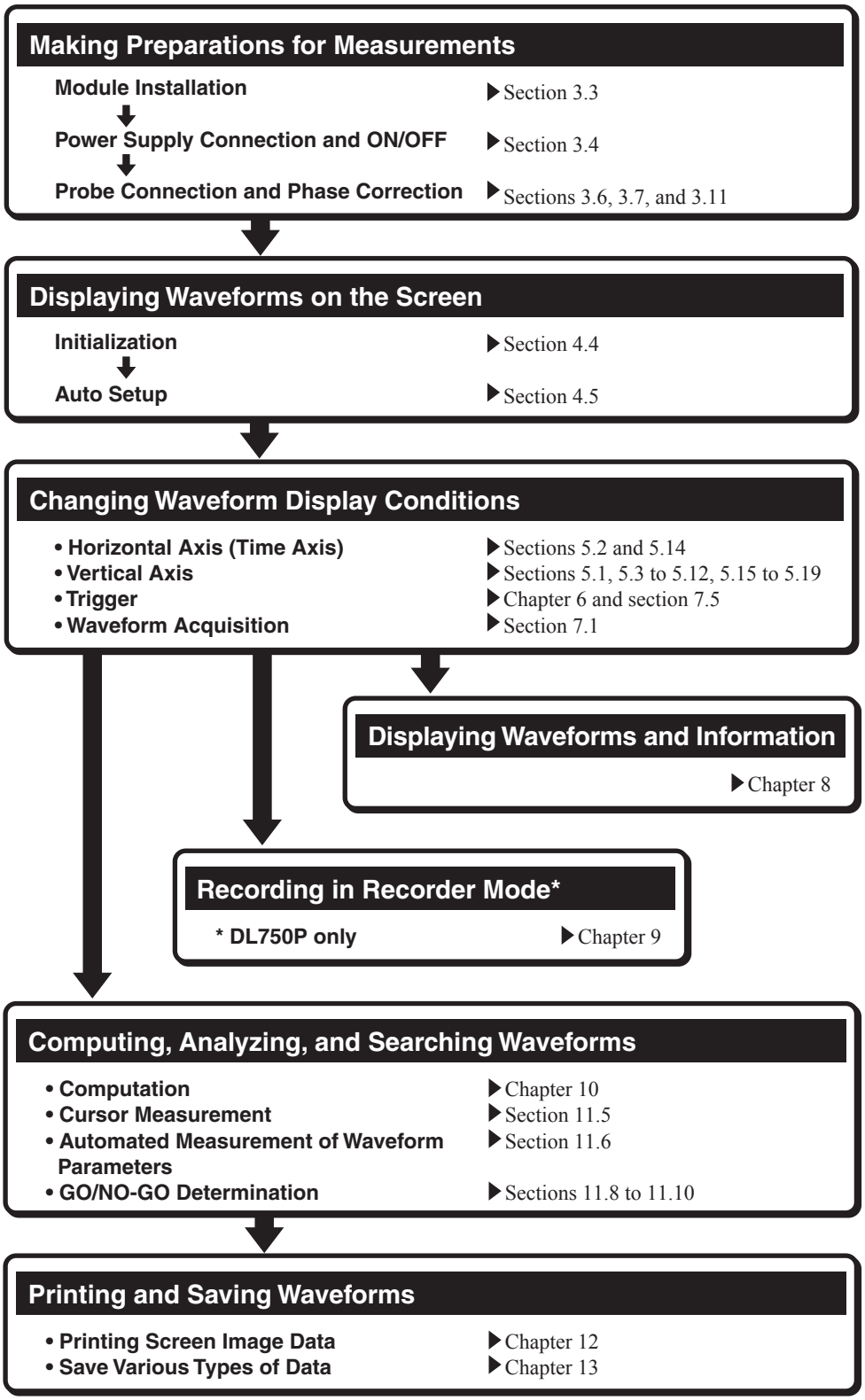
Making Preparations before Observing Waveforms ..... 16
Displaying Waveforms on the Screen ..... 18
Changing the Waveform Display Conditions ..... 19
Changing the Trigger Setting ..... 22
Measuring Waveforms ..... 24
Zooming the Waveform along the Time Axis ..... 25
Printing/Saving Waveforms ..... 26

**Setup Menu Items ..... 28**

SETUP (CAL) ..... 28
CH1 to CH16 (LOGIC, EVENT, DSP) ..... 29
ACQ ..... 36
ALL CH ..... 36
SIMPLE/ENHANCED ..... 37
MODE (ACTION) ..... 38
POSITION (DELAY) ..... 40
DUAL CAPTURE ..... 41
DISPLAY (X-Y) ..... 42
MEASURE (GO/NO-GO) ..... 44
CURSOR ..... 47
HISTORY ..... 48
MATH ..... 49
ZOOM (SEARCH) ..... 50
VOICE MEMO ..... 53
PRINT ..... 54
IMAGE SAVE ..... 55
FILE ..... 55
RECORDER (Only DL750P) ..... 56
MISC ..... 58

# Flow of DL750/DL750P Operation

The figure below is provided to familiarize the first-time user with the general flow of the DL750/DL750P operation as given in the user's manual (not the flow of operations given in this guide). For details on each item, see the respective chapter or section in the user's manual indicated by the ▶ mark.



# Front Panel Controls

**HISTORY key** ▶ Sections 11.1 and 11.2
Displays a menu used to display past data using the history memory function.

**(SHIFT+) ZOOM key**
▶ Sections 8.5 and 11.4
Displays a menu related to the zoom display of waveforms. Pressing the SHIFT key followed by the ZOOM key displays a menu related to data search (search & zoom function).

**ESC key** ▶ Section 8.13
Used to clear the menu. When a menu is cleared using the ESC key, the channel information appears. If you press the ESC key again, the channel information is cleared, and the waveform display area is expanded horizontally.

**(SHIFT+) SETUP key**
▶ Sections 4.4 to 4.6
Displays a menu related to initialization and auto setup. Pressing the SHIFT key followed by the SETUP key displays a menu related to calibration.

**(SHIFT+) DISPLAY key**
▶ Sections 8.1 to 8.13
Displays a menu related to the screen display. Pressing the SHIFT key followed by the DISPLAY key displays a menu related to X-Y display.

**ACQ key** ▶ Sections 5.14, 7.2 to 7.4, and 7.6
Displays a menu used to set the w aveform acquisition mode.

**(SHIFT+) MEASURE key** ▶ Sections 11.6 and 11.7
Displays a menu used when performing automated measurement of waveform parameters or cycle statistical processing. Pressing the SHIFT key followed by the MEASURE key displays a menu related to GO/NO-GO determination.

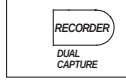
**CURSOR key** ▶ Section 11.5
Displays a menu used when performing cursor measurements.

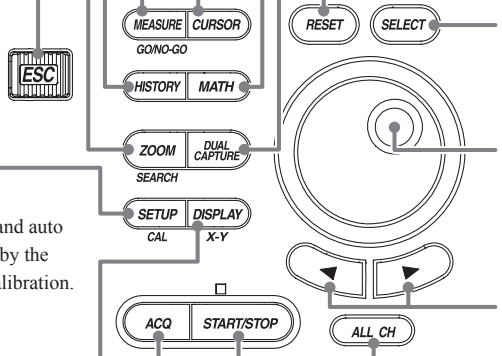
**MATH key** ▶ Chapter 10
Displays a menu related to the waveform computation.

**DL750: DUAL CAPTURE key** ▶ Section 7.6
Displays a menu related to the dual capture function.

**DL750P: RECORDER key** ▶ Chapter 9
Displays a menu related to the recorder mode.
Pressing the SHIFT key followed by the RECORDER key displays a menu related to the dual capture function.

**On the DL750P**




**RESET key**
Resets the value entry to the initial value (default).

**SELECT key**
Confirms the menu item that you selected using the jog shuttle.

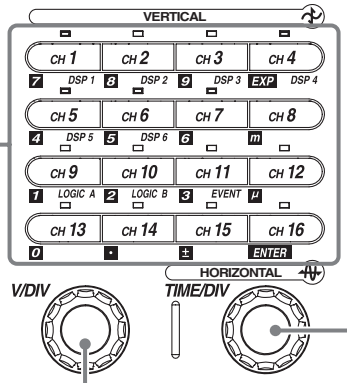
**Jog shuttle**
Used to change settings and move the cursor. Turn the shuttle ring to change the amount of change according to its angle.

**Arrow keys**
Moves the cursor left or right.

**ALL CH key** ▶ Section 5.13
Displays a pop-up window containing a list of settings similar to those displayed on the menu when one of the keys from CH1 to CH16 and DSP1 to DSP6 (/G3 option) keys is pressed.

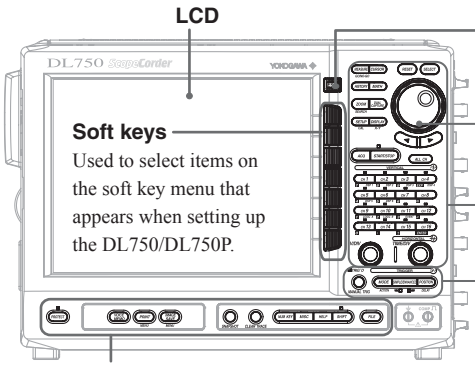
**START/STOP key** ▶ Section 7.1
Starts/Stops waveform acquisition according to the trigger mode.
Waveform acquisition is in progress when the indicator above the key is illuminated.

**CH1 to CH16 keys** ▶ Chapter 5
Displays a menu used to turn ON/OFF the display of each channel and set the vertical position, coupling, probe type, offset voltage, bandwidth limit, expansion or reduction of the vertical axis, linear scaling, and waveform labels. The indicator above each CH key illuminates when the corresponding channel is ON. In addition, pressing the SHIFT key followed by a CH key displays a menu corresponding to the purple characters indicated to the right of each key. Pressing the NUM KEY followed by a CH key causes the gray value marked below and to the left of each key to be entered.




**TIME/DIV knob** ▶ Section 5.2
This knob is used to set the time axis scale. If you change the setting while the waveform acquisition is stopped, the setting takes effect when you restart the waveform acquisition.

**V/DIV knob** ▶ Section 5.3
You can set the voltage sensitivity using this knob. Before turning it press a key from CH1 to CH16 to select the target channel. If you change the setting while waveform acquisition is stopped, the setting takes effect when you restart the waveform acquisition.


LCD
Soft keys
Used to select items on the soft key menu that appears when setting up the DL750/DL750P.
ESC key
For a description, see the previous page.
Jog shuttle
For a description, see the previous page.
Setup and execution keys/knob
For a description, see the previous page.
Setup and execution keys
For a description, see the figure below.
Setup and execution keys
For a description, see the figure below.

**PROTECT key** ▶Section 17.6
Pressing this key causes the LED above the key to illuminate, and the keys to be disabled. Pressing the key again clears the condition.

**(SHIFT+) IMAGE SAVE key**
▶ Sections 13.11, 12.12, and 16.3
Stores the screen image data to the storage medium.
Pressing the SHIFT key followed by the IMAGE SAVE key displays a menu related to the saving of the screen image data.

**(SHIFT+) PRINT key** ▶ Sections 12.2 to 12.4, and 16.4
Executes the printing of the screen image data.
Pressing the SHIFT key followed by the PRINT key displays a menu used when printing thescreen image to the internal printer, USB printer,or network printer.

**DL750: VOICE MEMO key** ▶ Section 7.9
Displays a menu related to the voice memo function.

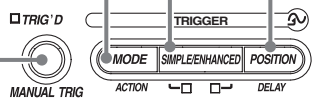
**DL750P: FEED key** ▶ Section 9.1
Executes paper feeding on the DL750P built-in printer.
Pressing the SHIFT key followed by the FEED key displays a menu related to the voice memo function.

**(SHIFT+) POSITION key** ▶ Sections 6.2 and 6.3
Sets the trigger position. Pressing the SHIFT key followed by the POSITION key allows you to set the trigger delay.

**SIMPLE/ENHANCED key** ▶ Sections 6.4 to 6.17
Displays a trigger setup menu. If the indicator below and to the left of the key is illuminated, simple trigger is enabled; if the indicator below and to the right of the key is illuminated, enhanced trigger is enabled.

**(SHIFT+) MODE key** ▶ Sections 6.1 and 6.18
Displays a menu used to select the trigger mode.
Pressing the SHIFT key followed by the MODE key displays a menu related to action-on-trigger or action-on-stop.

**MANUAL TRIG key** ▶Section 6.19
Press the key to forcibly activate a trigger.



**SNAPSHOT key** ▶Section 8.7
Leaves the currently-displayed waveform on the screen in black and white.

**CLEAR TRACE key** ▶Section 8.7
Clears the waveform acquired using the snapshot function and accumulated waveforms.

**NUM KEY key** ▶Section 4.2
Press this key to use the CH1 to CH16 keys as number input keys.

**MISC key** ▶Sections 3.5, 13.6, 16.2 to 16.10, 17.1, to 17.5, and 18.4
Displays menus for setting the communications interface, setting the environment, checking the system status, setting the SCSI ID number, accessing the self-diagnostic function, turning ON/OFF the LCD backlight, etc.

**HELP key** ▶Section 4.7
Turns ON/OFF the help window that provides descriptions about procedures.

**SHIFT key**
Pressing the key once causes the indicator above the key to illuminate and enables the setup menu marked below the key in purple to be displayed. Pressing the key again clears the condition.

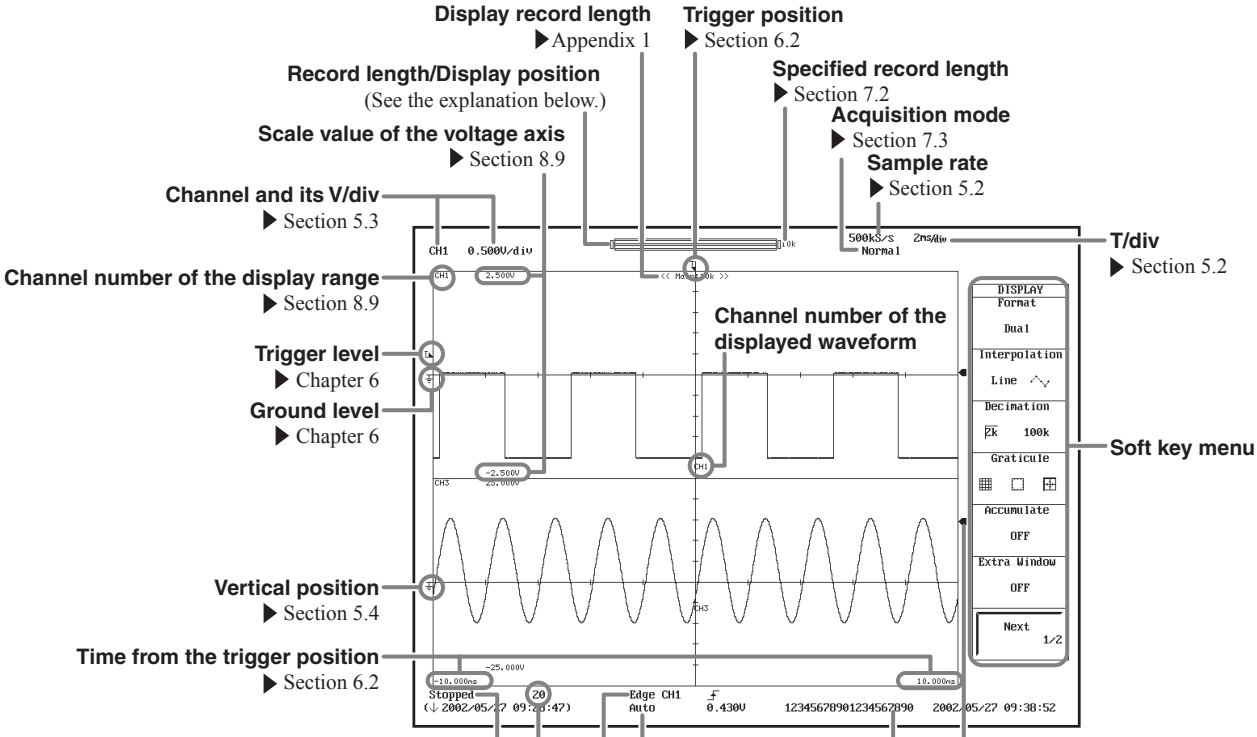
**FILE key** ▶Sections 13.5, 13.7 to 13.12, 13.14, to 13.17 and 16.3
Displays a menu used to save or recall data from various storage media or execute file operations.

For details on each control, see the chapter or section in the user's manual indicated by the ▶ mark.

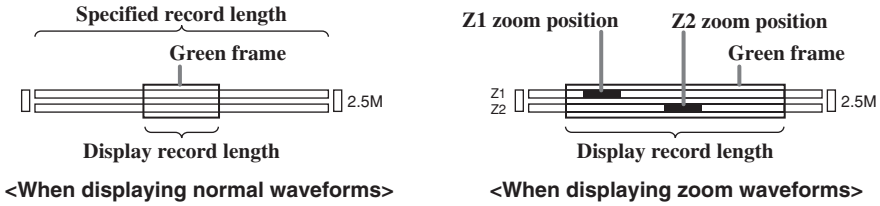
# Parts of the Screen

This section describes the menus and symbols that appear on the DL750/DL750P screen. For details on each item, see the chapter or section in the user's manual indicated by the ▶ or ● ● ● ▶ mark.

## Normal Display Screen

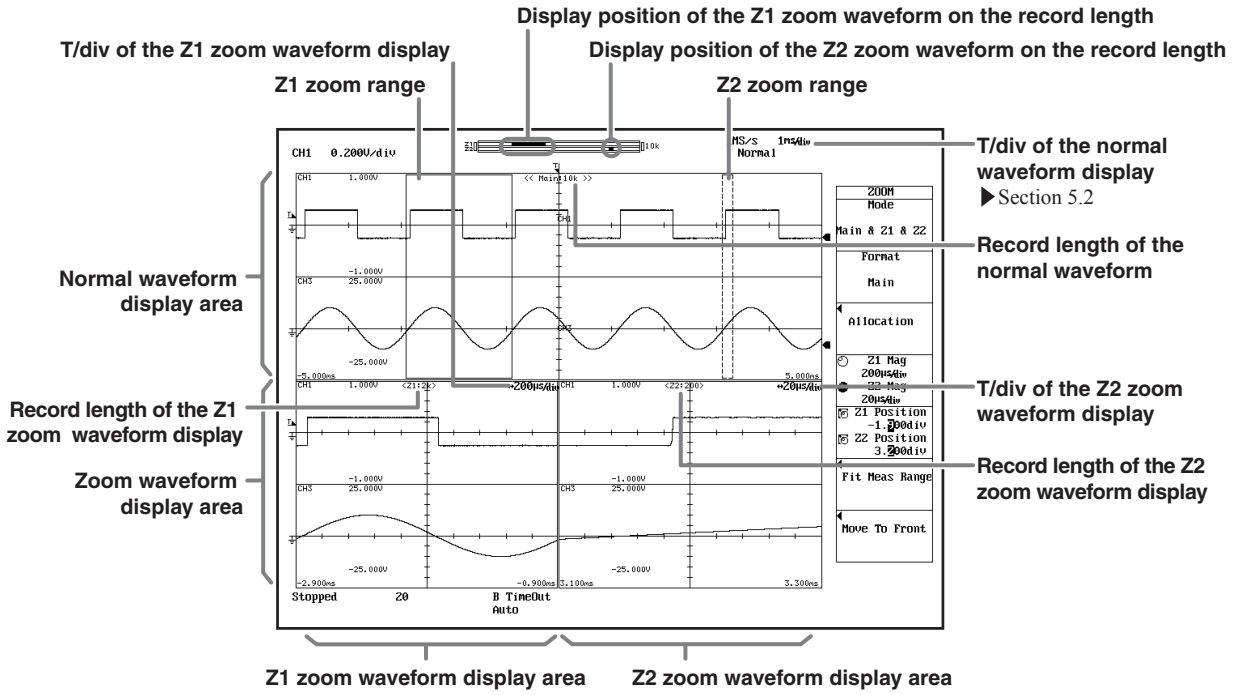



### Displaying the Record Length and Display Position



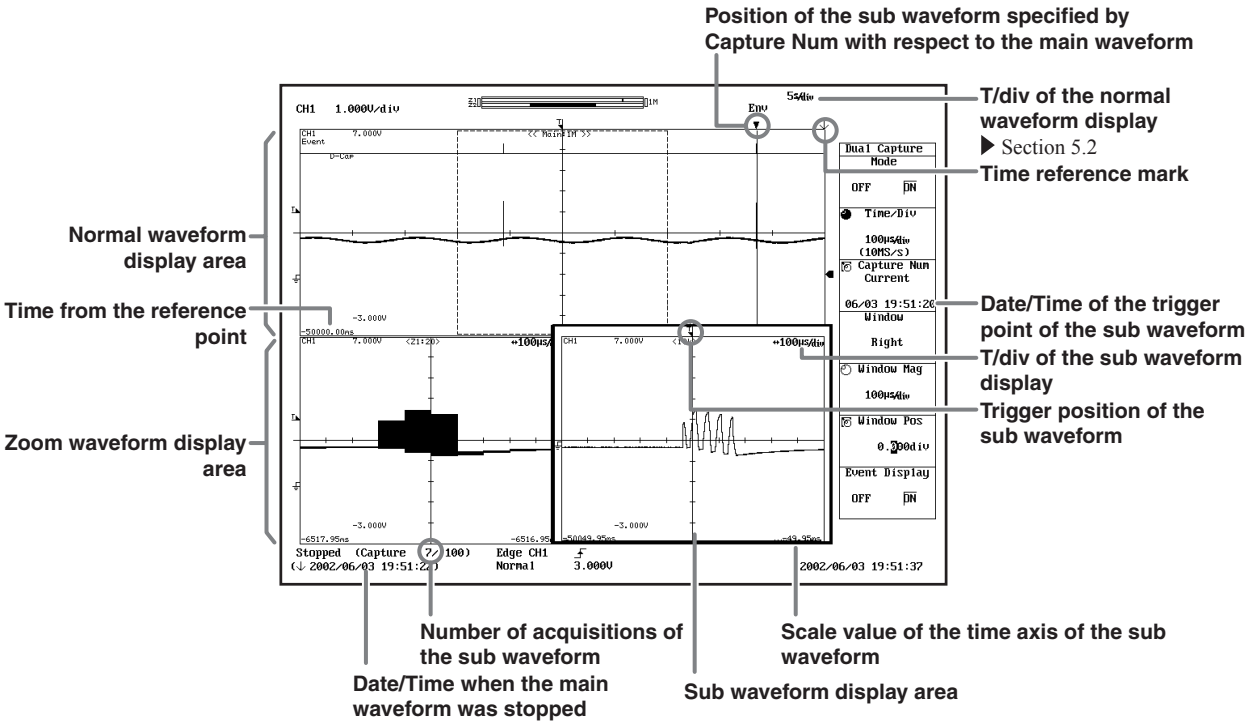
## Screen When Displaying Zoom Waveforms

Section 8.5, "Zooming the Waveform" in the User's Manual Part 1


Display position of the Z1 zoom waveform on the record length
T/div of the Z1 zoom waveform display
Display position of the Z2 zoom waveform on the record length
Z1 zoom range
Z2 zoom range
T/div of the normal waveform display
Section 5.2
Record length of the normal waveform
Normal waveform display area
T/div of the Z2 zoom waveform display
Record length of the Z1 zoom waveform display
Record length of the Z2 zoom waveform display
Zoom waveform display area
Z1 zoom waveform display area
Z2 zoom waveform display area

## Screen When Using the Dual Capture Function

Section 7.6, "Using the Dual Capture Function" in the User's mManual Part 1


Position of the sub waveform specified by Capture Num with respect to the main waveform
T/div of the normal waveform display
Section 5.2
Time reference mark
Normal waveform display area
Time from the reference point
Date/Time of the trigger point of the sub waveform
T/div of the sub waveform display
Trigger position of the sub waveform
Zoom waveform display area
Number of acquisitions of the sub waveform
Scale value of the time axis of the sub waveform
Date/Time when the main waveform was stopped
Sub waveform display area

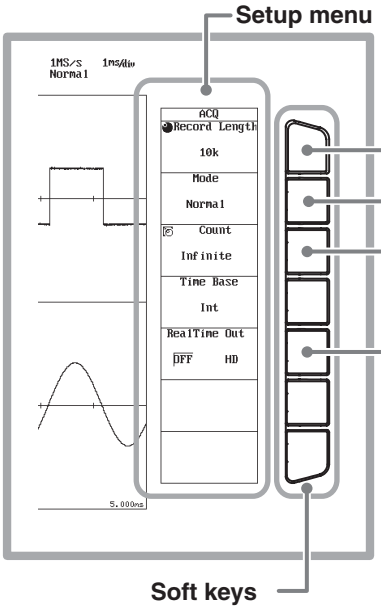
# Basic Key & Jog Shuttle Operations

This section describes basic key and jog shuttle operations used to enter settings on the DL750/DL750P.

## Basic Key Operations

### Operations When a Setup Menu Is Displayed

**In the case of the ACQ menu** (Setup menu displayed when the ACQ key is pressed)




**Menu type on which the jog shuttle is used to select items** (menu with a ◕ or ◴ icon)
Press a soft key to set a menu under jog shuttle control (◕: selected, ◴ : not selected).
Turn the jog shuttle to change the setting.

**Menu type on which a selection menu is displayed for selecting items**
Press a soft key to display a selection menu, then press the soft key corresponding to the desired menu item.

**Menu type on which the jog shuttle is used to set the value** (menu with a ◕ or ◴ icon)
Press a soft key to set a menu under jog shuttle control (◕: selected, ◴: not selected).
Turn the jog shuttle to set the value. Press the arrow keys to change the selected digit.
The NUM KEY key (see page 5) can also be used to enter the value directly.

**Menu type on which the item is selected from the displayed selections**
The selected item switches each time the soft key is pressed. The selected item is displayed highlighted.

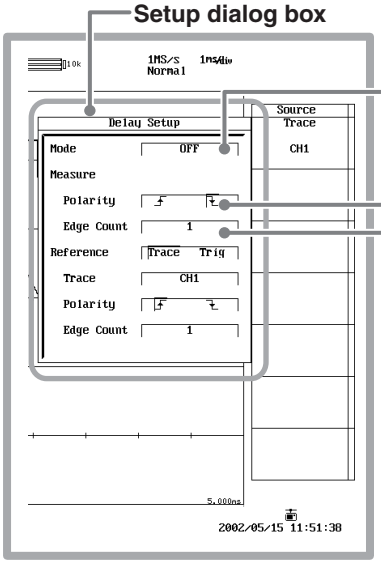
**Note**

**Displaying Setup Menus Indicated by Purple Characters on the Front Panel**
Press the SHIFT key to illuminate the indicator above the SHIFT key, and then press the key corresponding to a setup menu marked in purple.

### Operations When a Setup Dialog Box Is Displayed

**In the case of the delay setup dialog box**

(When MODE is set to ON and the Delay Setup soft key is pressed on the setup menu that appears when the MEASURE key is pressed)



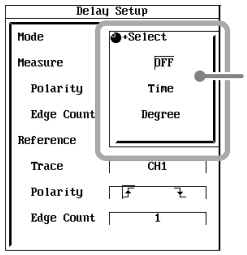

Select the item you wish to set using the jog shuttle.

Press the **SELECT** key to display the selection menu. Turn the **jog shuttle** to move the **cursor** to the item you wish to set. Press the **SELECT** key to confirm the selection.

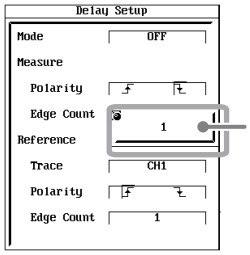
The selection item switches each time the **SELECT** key is pressed.

Press the **SELECT** key to display the value entry box. Turn the **jog shuttle** to set the value. Press the **arrow keys** to change the selected digit. The NUM KEY key can also be used to enter the value directly.

**When Mode is selected**




**When Edge Count is selected**

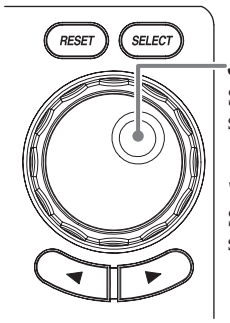



**Note**

To clear a setup menu or a setup dialog box from the screen, press the ESC key.

# Basic Jog Shuttle Operation

## Selecting Items

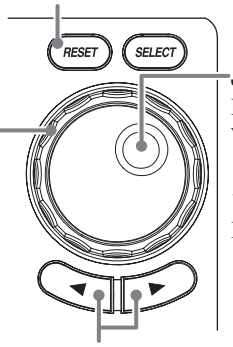



**Jog shuttle**
Selects items above the currently-selected item.

Select items below the currently-selected item.

## Setting Values

Resets the value to the initial value.




**Jog shuttle**
Decreases (slows down) the value.

Increases (speeds up) the value.

**Arrow keys**
Move the cursor left or right.

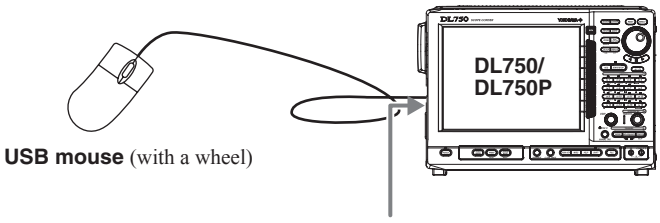
**Shuttle ring**
Varies the amount of change depending on the rotation angle.

**Tip**

## Operations Using a USB Mouse

Section 4.2, "Entering Values and Strings" in the User's Manual Part 1

By connecting a USB mouse to the USB PERIPHERAL connector on the side panel, you can use the mouse to perform the same operations as you would using the front panel keys of the DL750/DL750P.



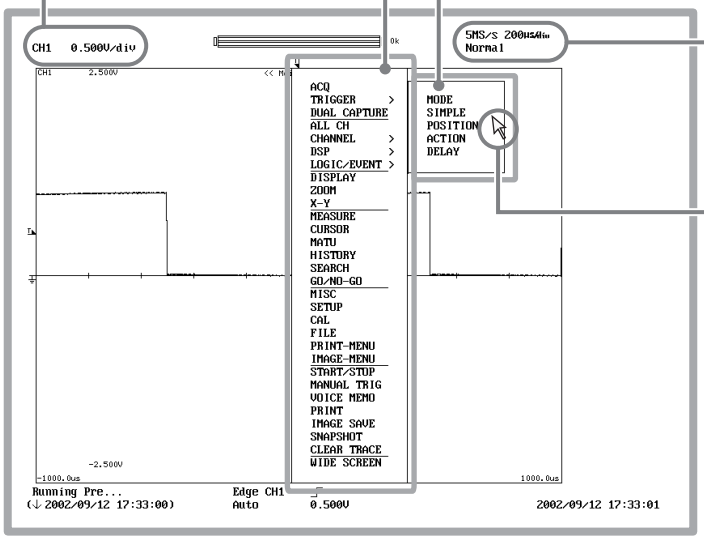

**USB mouse** (with a wheel)

**USB PERIPHERAL connector**

**Top menu**
Right-click on the screen (waveform display area) to display the names of the front panel keys as a top menu.

Moving the pointer to this position causes the pointer's appearance to change from to . In this condition, turn the wheel to change the V/div setting.

**Sub menu**
For items lower in the hierarchy than the top menu, a sub menu is displayed.




Moving the pointer to this position causes the pointer's appearance to change from to . In this condition, turn the wheel to change the T/div setting.

**Pointer**
Move the pointer to the item you wish to select and left-click. The setup menu corresponding to the selected item appears.

# Main Functions of the DL750/DL750P

## Trigger

Chapter 6, "Triggering" in the User's Manual Part 1

There are two main types of triggers: simple triggers and enhanced triggers.

### Simple triggers

**Input signal trigger**
A trigger is activated when the trigger source passes through a specified trigger level (rising edge, falling edge, or both).

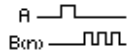
**External trigger**
A trigger is activated when the signal applied to the EXT TRIG terminal passes through a specified trigger level (rising edge or falling edge).

**Line trigger**
A trigger is activated on the rising edge of the power supply signal.

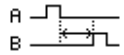
**Timer trigger**
A trigger is activated at a specified time or at specified time intervals.

### Enhanced triggers

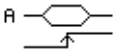
**A → B(N) trigger**
A trigger is activated on the nth time condition B becomes true after condition A becomes true.



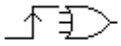

**A Delay B trigger**
A trigger is activated on the first time condition B becomes true the specified time after condition A becomes true.



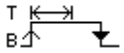

**Edge On A trigger**
A trigger is activated on the OR condition of the edges while trigger condition A is true.



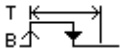

**OR trigger**
A trigger is activated when any one of the trigger conditions of multiple trigger sources becomes true.



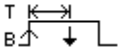
**B > Time trigger**
A trigger is activated when the pulse width is greater than the specified time.



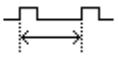

**B < Time trigger**
A trigger is activated when the pulse width is smaller than the specified time.



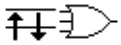

**B TimeOut trigger**
A trigger is activated when the specified timeout time is reached.



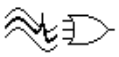

**Period trigger**
A trigger is activated when the period of the signal matches the specified condition.



**Window trigger**
A trigger is activated when the trigger source enters or leaves the range specified by two signal levels.



**Wave window trigger**
This trigger is used to monitor the po wer supply waveform. It detects abnormalities in the po wer supply (disruption, sag, ser ge, frequenc y fluctuation, v oltage drop, etc.). Applicable waveforms are AC waveforms whose frequenc y is between 40 to 1000 Hz. A trigger is activated when the waveform deviates from the reference waveform*.



* Waveform created by setting a tolerance to 1 c ycle of the w aveform obtained by averaging 1 to 4 previous cycles of 1 cycle of the w aveform set to be the reference (realtime template).

## Linear Scaling

Section 5.11, "Using the Linear Scaling Function (AX+B, P1-P2)" in the User's Manual Part 1

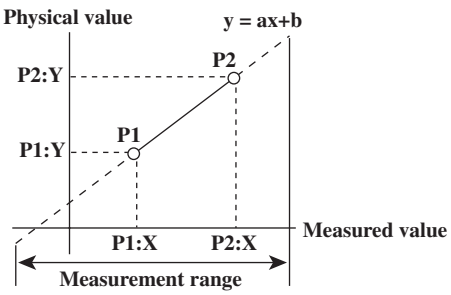
Linear scaling is a function used to convert measured values (mainly voltage) to physical values. The following two methods are available.

**AX + B**

Computation is performed using scaling coefficient A and offset B according to the following equation.
Y = AX + B (X: measured value, Y: physical value)

**P1-P2**

Specifying the physical values after the conversion that correspond to the measured values of two arbitrary points (P1:X, P2:X) determines the scale conversion equation (y = ax + b). Computation is performed using this conversion equation.



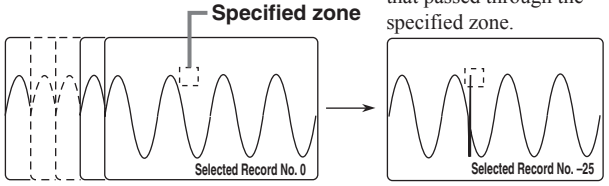
# History Memory

Section 11.1, "Displaying History Waveforms" in the User's Manual Part 2

When waveforms are being measured, the waveform data stored in the acquisition memory is displayed as waveforms on the DL750/ DL750P screen. When waveforms are continuously measured, it is impossible to stop the measurement in time when an abnormal waveform appears (newer waveforms appear on the screen). Normally, past abnormal waveforms cannot be displayed. However, past waveform data stored in the acquisition memory can be displayed using the history memory function while measurement is stopped. You can display a specified past waveform data from the data (up to 2000 screens worth) stored in the acquisition memory. In addition, you can search for waveforms that passed (or did not pass) a specified zone from waveforms stored in the acquisition memory. For details, see sections 11.2 and 11.3 in the user's manual.

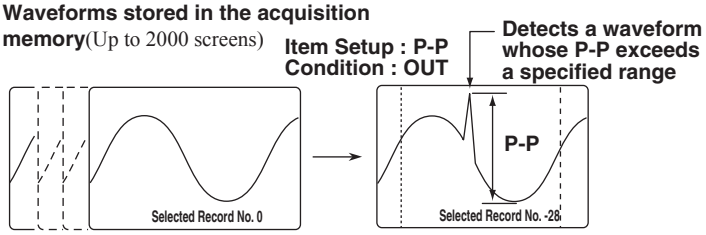
**Zone**

**Waveforms stored in the acquisition memory**(Up to 2000 screens)




**Paramerter**

**Waveforms stored in the acquisition memory**(Up to 2000 screens)


Item Setup : P-P
Condition : OUT
Detects a waveform whose P-P exceeds a specified range
Selected Record No. 0
P-P
Selected Record No. -28

# Dual Capture

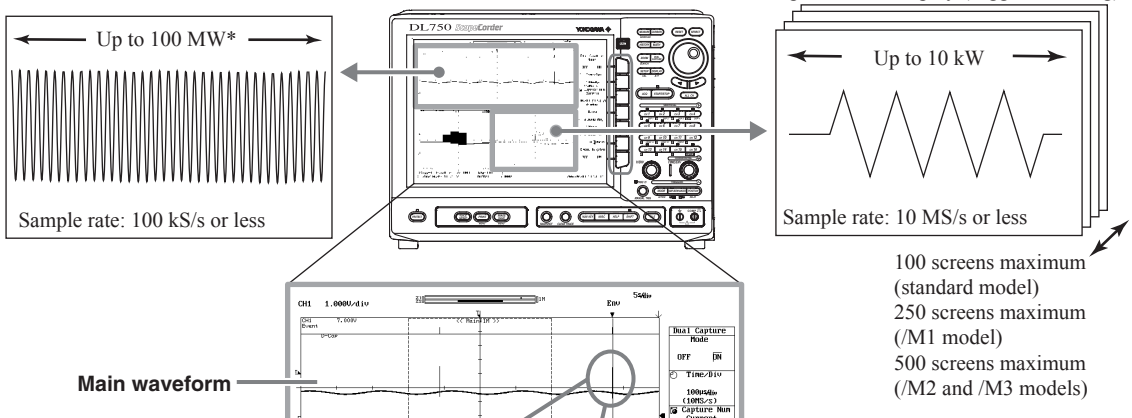
Section 7.6, "Using the Dual Capture Function" in the User's Manual Part 1

This function enables trend recording in low-speed roll mode[1] while acquiring data at high speeds. The function is useful when capturing at high speeds abnormal phenomena that occur suddenly during long-term observations, such as in an endurance test.

**Low speed (main waveform)**
Roll mode display (trend recording)

Enables data acquisition at two different sample rates on a single unit.

**High speed (sub waveform)**
Update mode display (trigger recording)


Up to 100 MW*
Sample rate: 100 kS/s or less
DL750
Up to 10 kW
Sample rate: 10 MS/s or less
100 screens maximum (standard model)
250 screens maximum (/M1 model)
500 screens maximum (/M2 and /M3 models)
Main waveform
Sub waveform (dual capture)
Since data can be acquired at high sample rates (up to 10 MS/s), you can observe 5 incidents of burst waveforms. (T/div: 100 μs/div)
Zoom waveform (zooming the time axis)
You can detect the occurrence of burst waveforms. However, since the time resolution of the measured data is not high enough, you are unable to determine how many burst waveforms occurred. (T/div: 100 μs/div)

* Up to 100 MW when the /M3 option is installed. Up to 5 MW on the standard model.

1. If the trigger mode is set to Auto, Auto Level, Single, or Log and the time axis is set between 100 ms/div and 3 day/div, the waveform is displayed in roll mode. In roll mode, the displayed waveform is not updated on the occurrence of triggers (update mode). Rather, the oldest data is deleted as new data is acquired, and the waveform is shifted from right to left on the screen.

## X-Y Waveform Display

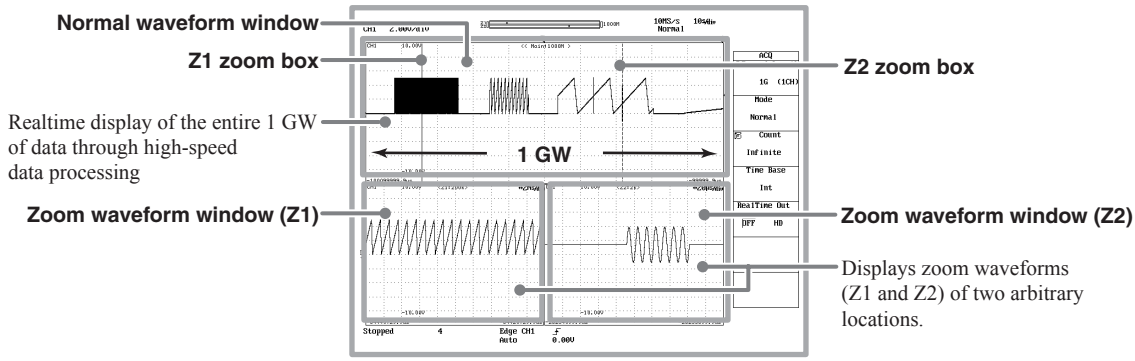
Section 8.6, "Displaying X-Y Waveforms" in the User's Manual Part 1

The voltage relationship between signals can be observed by assigning the voltage of the input signal of the specified channel on the horizontal axis (X-axis) and the voltage of another input signal (signal that has the display turned ON) on the vertical axis (Y-axis). Simultaneous observation of an X-Y waveform and a normal T-Y waveform (waveform display using time axis and voltage axis) is also possible.
Up to 16 X-Y waveforms can be displayed overlapped. The display of multiple X-Y waveforms facilitates the comparison of the relative phase. This function can be used to evaluate DC motors using lissajous waveforms.

## Zooming along the Time Axis (GIGAZoom)

Section 8.5, "Zooming the Waveform" in the User's Manual Part 1

The displayed waveform can be expanded (zoomed) along the time axis. Two locations can be zoomed at once. This function is useful during long waveform acquisitions where you wish to observe a particular section of the waveform closely.
In addition, high-speed data processing enables instantaneous display of the entire 1 GW (1 CH) of data (/M3 option).


Normal waveform window
Z1 zoom box
Z2 zoom box
Realtime display of the entire 1 GW of data through high-speed data processing
1 GW
Zoom waveform window (Z1)
Zoom waveform window (Z2)
Displays zoom waveforms (Z1 and Z2) of two arbitrary locations.

## Automated Measurement of Waveform Parameters

Section 11.6, "Automated Measurement of Waveform Parameters" in the User's Manual Part 2

This function automatically measures parameters such as the waveform frequency and rise time. There are 29 waveform parameters. Up to 24000 data points for all waveforms can be saved. Of those, up to 24 arbitrary parameters can be displayed on the screen.

**Vertical-axis parameters (12)**

| | | | |
|---|---|---|---|
| P-P | | Amp | |
| Max | | Min | |
| High | | Low | |
| Avg | | Mid | |
| Rms | | Sdev | |
| +OvrShoot | | -OvrShoot | |

**Time-axis parameters (12)**

| | | | |
|---|---|---|---|
| Rise | | Fall | |
| Freq | | Period | |
| +Width | | -Width | |
| Duty | | Pulse | |
| Burst1 | | Burst2 | |
| AvgFreq | | AvgPeriod | |

**Other parameters (4)**

| | | | |
|---|---|---|---|
| Int1TY | | Int2TY | |
| Int1XY | | Int2XY | |

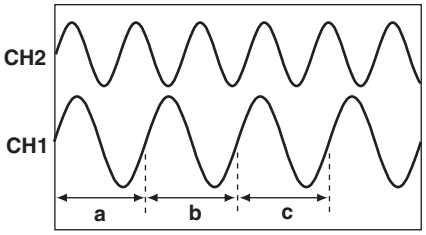
**Delay parameter (1)**
Time difference from the reference waveform or trigger point to the rising or falling edge of the target waveform. Parameters related to (delay between channels)

## Cycle Statistical Processing

Section 11.7, "Performing Statistical Processing" in the User's Manual Part 2

Automatically divides a periodic waveform stored to the acquisition memory into cycles, and measures the waveform parameters. Then, statistical processing is performed on the automated measurement values. The DL750/DL750P screen displays 5 statistical processing parameters (maximum (Max), minimum (Min), average (Avg), standard deviation (sdv), and the number of measured values used in the statistical processing (Cnt)) on the automated measurement parameters of the waveform. A list of all measured values can also be displayed. Statistical processing can be performed on up to 48000 automated measurement values of a single waveform parameter. If statistical processing is performed on 1 automated measurement parameter, statistical processing of up to 48000 cycles is possible. In addition to the cycle statistical processing, the DL750/DL750P has "normal statistical processing" and "statistical processing of the history memory."

**Example in which CH1 is selected as the waveform used to determine the cycle**

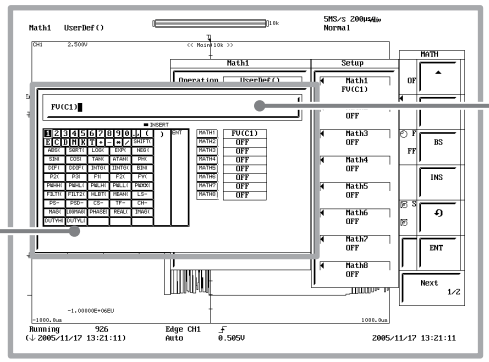



Automated measurement parameters are measured in each range, a, b, and c, and statistical processing is performed on the automated measurement parameters in the order a, b, and c. The automated measurement parameters of other channels are also measured using ranges a, b, and c. Automated measurement can also be made using the cycle of each waveform as the range.

## Computation (Standard) & User-Defined Computation (/G2 Option)

Section 10.5, "User-Defined Computation (Optional)" in the User's Manual Part 2

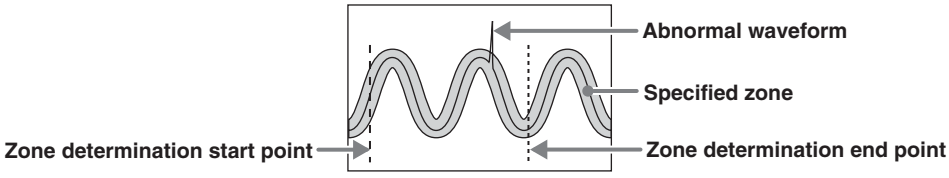
The following types of computation are possible: +, –, ×, /, FFT (power spectrum), and phase shift computation (computation with the phase between channels shifted). On models with the user-defined computation function (/G2 option), up to 8 equations can be defined using abundant functions (such as trigonometric functions, differentiation, integration, square root, digital filter, and 7 types of FFT functions).


The entered equation is displayed.
Equation setup menu
Using the software keyboard on the screen, enter the desired equation using up to 55 characters.

## GO/NO-GO Determination

Section 11.8, "GO/NO-GO Determination Using Measured Waveform Parameters" to 11.10, "Using the GO/NO-GO Determination I/O Function" in the User's Manual Part 2

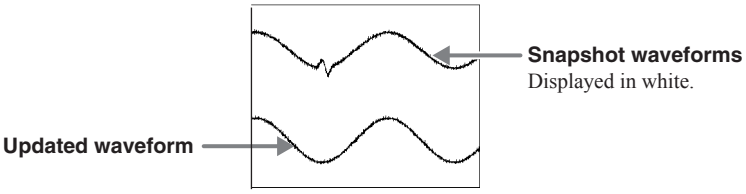
The GO/NO-GO function is useful when you want to inspect signals or track down abnormal symptoms on a production line.
The function determines whether the waveform is within the preset range and performs a predetermined action when the decision is GO (or NO-GO). There are two methods in making the determination: a method in which a waveform zone is set on the screen and a method in which a waveform parameter range is specified. The possible actions taken when a specific determination is made include printing/saving of the screen image data, saving of the waveform data, sounding of a beep, and sending of an e-mail message (with the /C10 option).




## Snapshot

Section 8.7, "Taking Snapshots and Clearing Traces" in the User's Manual Part 1

When the trigger mode is set to a mode other than Single, the screen display is either in update mode, in which the display is updated periodically, or roll mode (see "Dual Capture" on page 11). By using the snapshot function, you can temporarily hold the waveform that would be cleared when the screen is updated as a snapshot waveform on the screen. The snapshot waveform is displayed in white, allowing for easy comparison against the updated waveform. In addition, the snapshot waveform can be saved to a storage medium or the screen image data can be printed.




## Acquisition Memory Backup

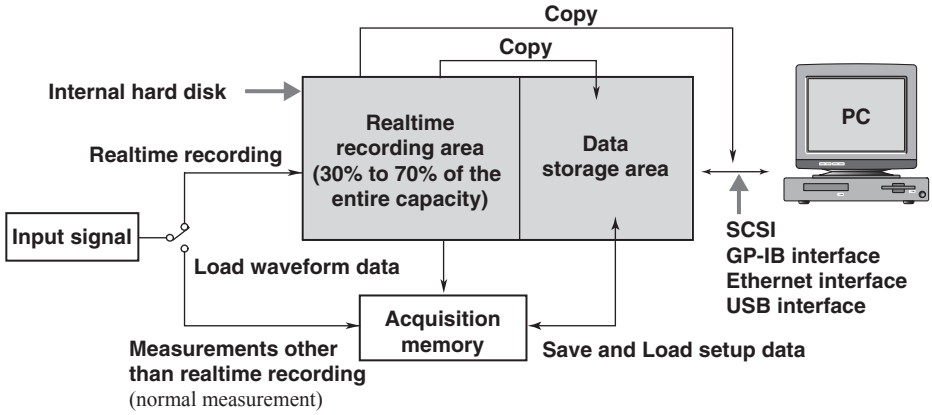
Section 7.10, "Using the Acquisition Memory Backup Function" in the User's Manual Part 1

This function protects the data in the acquisition memory from sudden power failures. Turn ON the ACQ MEMORY BACKUP switch on the right side panel to protect the data in the acquisition memory even when the power supply is cut off. The data held in the acquisition memory immediately before the power is turned OFF is backed up.
Alkaline dry cells or nickel hydride rechargeable batteries (four AAA batteries) are required for the backup.

## Realtime Recording to the Internal Hard Disk (/C8 Option)

Section 7.7, "Realtime Recording to the Internal Hard Disk (Optional)" in the User's Manual Part 1

Measured data can be saved in realtime over long periods to the internal hard disk (requires the /C8 option). On the internal hard disk, half the total size of the disk is allocated beforehand to be used as area for realtime recording. You can set the size of the realtime recording area in the range of 30% to 70% of the entire capacity of the internal hard disk. The saved data can be loaded, and the measured data can be managed and analyzed on a PC.




## Recording in Recorder Mode (Realtime Recording) (DL750P Only)

Chapter 9, "Recording in Recorder Mode (Realtime Recording)" in the User's Manual Part 1

The DL750P is equipped with a recorder mode in which waveforms and numeric values can be recorded on a built-in A4-size printer. The recorder mode is set using the RECORDER key on the DL750P front panel. There are two recorder modes.

### Chart Recorder Mode

When waveform acquisition is started, waveforms and numeric values can be recorded in realtime on the built-in printer. Because the data is saved to the internal memory at the same time, the required sections can be redisplayed such as by using the search & zoom function after the recording is completed. The stored data can be handled in the same fashion as normal data such as saving the data to a file, performing cursor measurements, automated measurement of waveform parameters, normal statistical processing, and search & zoom.

- **T-Y Waveform Recording**
  T-Y waveforms are recorded at a specified chart speed. If shot recording is specified, the recording stops automatically when the specified length of data is recorded. The data can be reprinted by changing the print conditions, and a PDF file of the reprinted image can be created.
- **Numeric Value Recording**
  The numeric values are recorded at specified time intervals. Up to 16 channels can be recorded at once.

### X-Y Recorder Mode (X-Y Waveform Recording)

When waveform acquisition is started and stopped, the X-Y waveforms during the waveform acquisition period can be recorded. If auto print is specified, the recording of the X-Y waveforms starts when waveform acquisition is stopped. A PDF file of the reprinted image can be created.

**Chart Recorder mode and X-Y Recorder mode**

| | Chart Recorder Mode | | X-Y Recorder mode (X-Y waveform recording) |
|---|---|---|---|
| | T-Y waveform recording | Numeric value recording | |
| **Chart speed or recording interval** | Chart speed: 10 mm/h to 20 mm/s | Recording interval: 1 s to 60 min | — |
| **Recording graticule** | Horizontal axis (time axis): 10 mm/div<br>Vertical axis: 10 mm/div or [1 division of the 10 equally divided recording area]/div | — | X-axis/Y-axis: 10 mm/div or [1 division of the 10 equally divided recording area]/div |
| **Acquisition mode** | Envelope (the mode cannot be changed with the ACQ key, envelope and normal can be changed with the MISC key) | | Normal (the mode cannot be changed with the ACQ key) |
| **Trigger mode** | Auto, Log, Single[1], Repeat[1] (1: Only during T-Y waveform recording) | | — |
| **Number of data points that can be saved to the internal memory** | Up to 1000 div (varies depending on the chart speed) | | Fixed to 1 MW |
| **Functions that cannot be used simultaneously** | History memory, GO/NO-GO determination, dual capture, waveform computation, and search & zoom (only during X-Y Recorder mode) | | |

# DSP Channel (/G3 Option)

Chapter 15, "Using the DSP Channel (Optional)" in the User's Manual Part 2

When the /G3 option is installed, 6 dedicated computation channels (DSP1 to DSP6) are added in addition to the standard analog input channels (CH1 to CH6). The following computations can be performed in realtime using the output data of the input module as a source on the DSP (Digital Signal Processor) channels.

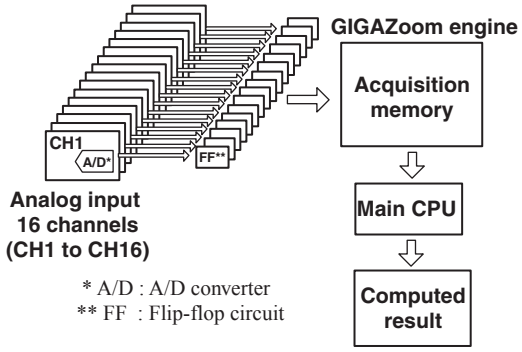
- Addition, subtraction, multiplication, and division (+, –, ×, and ÷) between channels
- Digital filter (sharp, Gauss, IIR (Butterworth), and moving average)
- Differentiation and integration
- Addition, subtraction, multiplication, and division (+, –, ×, and ÷) with coefficients between channels
- Knocking filter

Below are the characteristics of the computation using DSP channels as compared with normal computation.

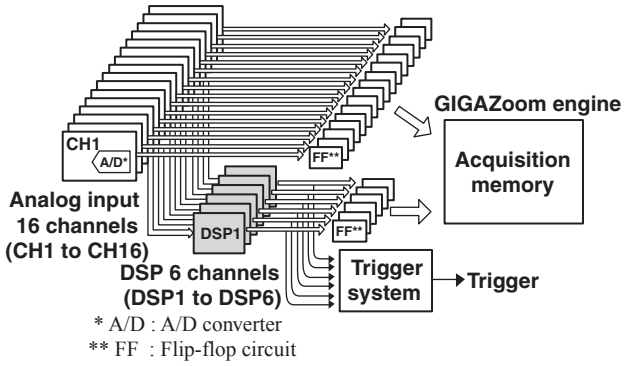
**Comparison of Normal Computation (Math1 to Math8) and Computation on DSP Channels (DSP1 to DSP6)**

| | Normal Computation (Math1 to Math8) | Computation on DSP Channels (DSP1 to DSP6) |
|---|---|---|
| Record length limitation | Exist (Up to 800 kW (when displaying 1 channel)) | None (same as analog input channels) |
| Maximum sample rate | Maximum sample rate of each module | 100 kS/s |
| Trigger source target | None | Yes (Only simple trigger and OR trigger/window trigger of enhanced triggers) |
| Computation during roll mode display | None (computes after waveform acquisition stops) | Yes (computed in realtime) |
| Applicable modules | All modules | All modules |
| Executable computations | Complicated computations and various equations (Addition, subtraction, multiplication, division, binary computation, power spectrum, and user-defined computation (/G2 option) | Comparatively simple computation (Addition, subtraction, multiplication, division, digital filter, differentiation, and integration |

**• Normal Computation (Math1 to Math8)**




**• Computation on DSP Channels (DSP1 to DSP6)**

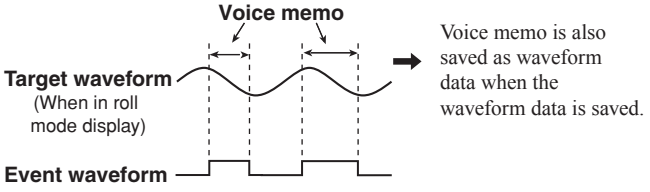



# Voice Memo & Voice Comment

Section 7.9, "Using the Voice Memo Function" to 13.19, "Using the Voice Comment Function" in the User's Manual

### Voice Memo

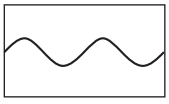
By connecting a earphone microphone with a PUSH switch to the DL750/DL750P, you can record your voice as a memo while waveforms are being acquired (when in roll mode display). The recorded voice can be played when the corresponding waveform is being displayed. The recorded voice memo can be saved along with the waveform data and can be played from the Voice Memo menu.


Voice memo
Target waveform
(When in roll mode display)
Event waveform
Voice memo is also saved as waveform data when the waveform data is saved.

### Voice Comment

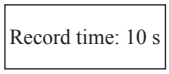
By connecting a earphone microphone with a PUSH switch to the DL750/DL750P, you can record a comment on the displayed waveform using your voice. When saving the screen image data, the voice comment can also be saved. The maximum length of voice comment that can be attached to a single screen image data is 10 s. The saved voice comment can be played from the File List window of the IMAGE and FILE menus.

**• Screen image data**



Data whose extension is .PNG, .JPG, .BMP, or .PS

**• Voice comment data**




Data whose extension is .NCM, .JCM, .BCM, or .PCM

Can be saved simultaneously. (Screen image data and voice comment data are saved as separate files.)

# Operating the DL750/DL750P

The operation explained in this section is used to observe a signal (probe compensation signal) that is generated by the DL750/DL750P. Therefore, there is no need to prepare a separate signal generator. Additionally, this operation guide describes an example in which waveforms are observed using the High-Speed 10 MS/s, 12-Bit Isolation Module (model: 701250, abbreviated name: HS10M12). For operation using other input modules, see the user's manual.

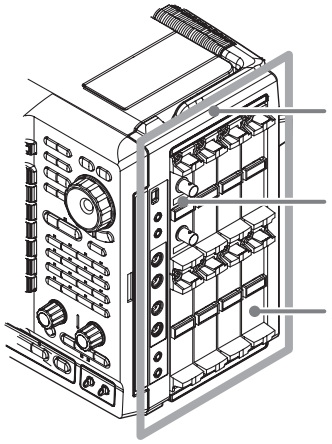
## Making Preparations before Observing Waveforms

### Install the Module

Section 3.3, "Installing Input Modules" in the User's Manual Part 1

**To use the DL750/DL750P in a safe manner, read the warnings given in section 3.3, "Installing Input Modules" in the user's manual before installing the module.**

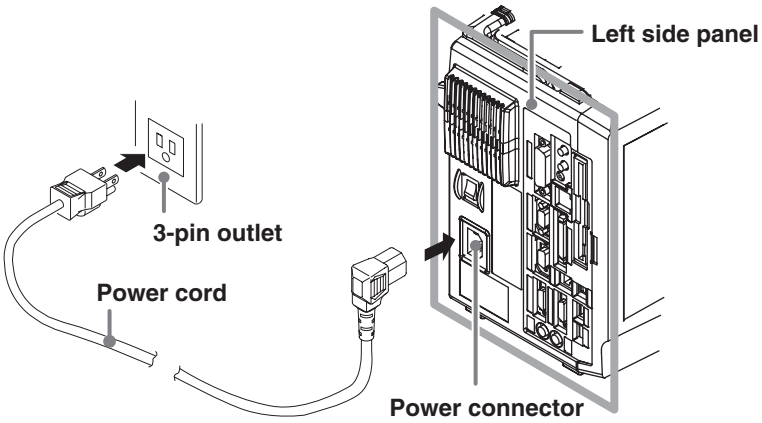
Install the module in the input module installation slot on the right side panel.




### Connect the Power Supply

Section 3.4, "Connecting the Power Supply" in the User's Manual Part 1

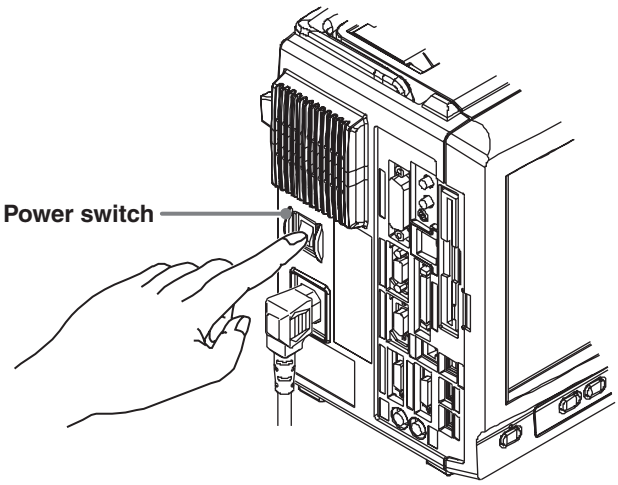
**To use the DL750/DL750P in a safe manner, read the warnings given in section 3.4, "Connecting the Power Supply" in the user's manual before connecting the power supply.**




| | |
|---|---|
| **Rated supply voltage:** | 100 to 120 VAC/200 to 240 VAC |
| **Permitted supply voltage range:** | 90 to 132 VAC/180 to 264 VAC |
| **Rated supply voltage frequency:** | 50/60 Hz |
| **Permitted supply voltage frequency range:** | 48 to 63 Hz |

## Turn ON the Power Switch

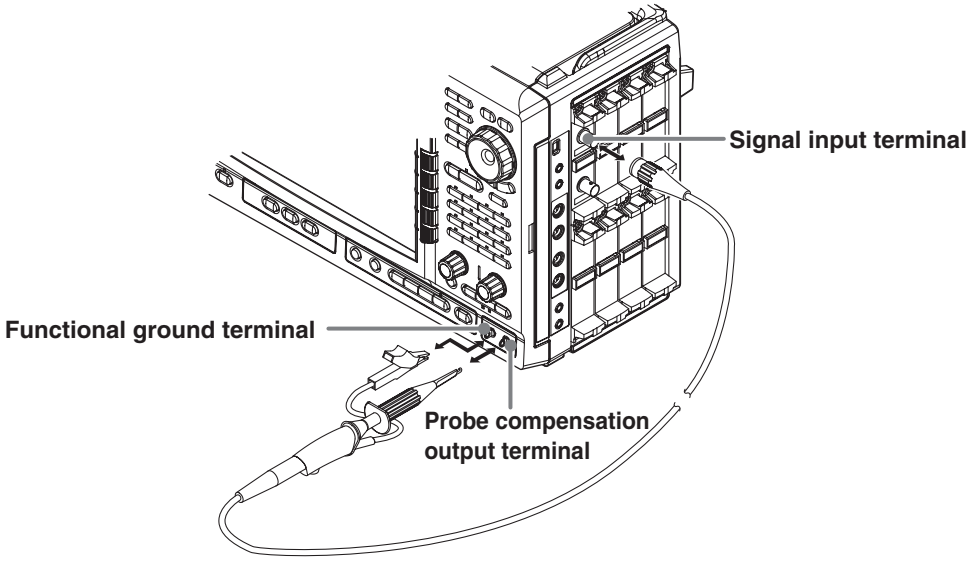
Section 3.4, "Connecting the Power Supply" in the User's Manual Part 1




## Connect the Probe

Section 3.6, "Connecting Probes" and 3.7, "Compensating the Probe (Phase Correction)" in the User's Manual Part 1

**To use the DL750/DL750P in a safe manner, read the warnings given in section 3.6, "Connecting Probes" and the cautions given in section 3.7, "Compensating the Probe (Phase Correction)" in the user's manual before connecting the probe.**




**Note**

When actually observing waveforms, make sure to perform phase correction (section 3.7) and calibration (section 4.6) of the probe according to the instructions in the user's manual. Otherwise, waveforms cannot be observed correctly.

# Displaying Waveforms on the Screen

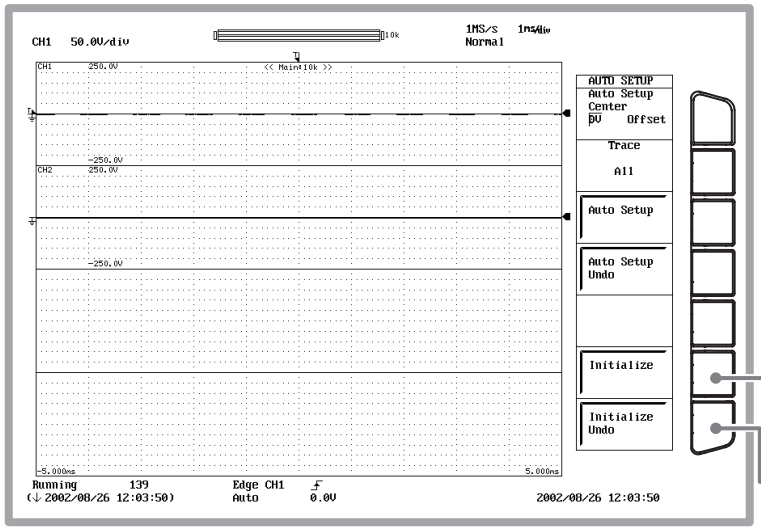
This section explains the operations of setup initialization and auto setup that are useful when displaying typical repetitive waveforms such as sine and rectangular waves.

## Initialize Settings

Section 4.4, "Initializing Settings" in the User's Manual Part 1

The settings made using the front panel keys are reset to factory default. This operation is not necessary if you are using the DL750/DL750P for the first time after purchase. However, we recommend that you try the operation for future reference. This initialization operation is useful when you wish to redo the settings from scratch according to the input signal.

SETUP **1** Press the **SETUP** key.




**2** Press **Initialize.**

To set the DL750/DL750P back to the condition that existed immediately before the initialization, press here.

### Note

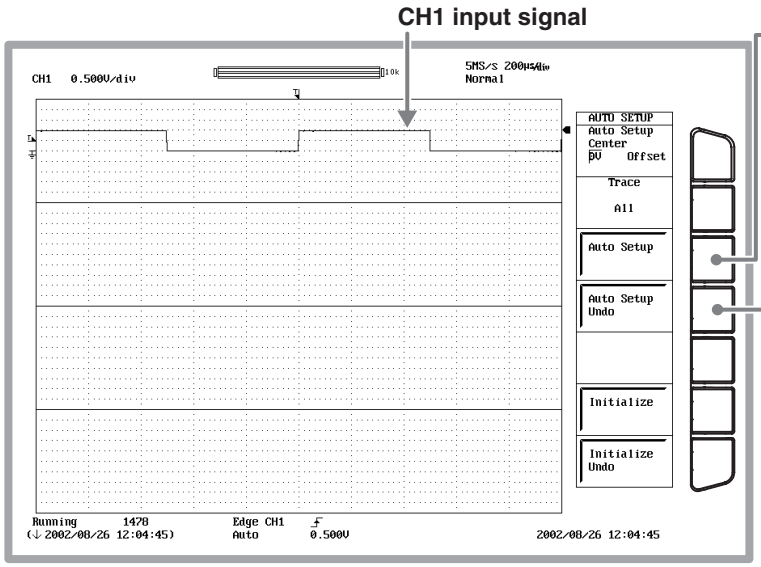
- When initialization is executed, all the channels with modules installed are displayed, and the DL750/DL750P enters the START condition.
- The items that cannot be initialized using the Initialize soft key are as follows:
  Date/time settings, language settings, communication settings, and SCSI ID setting
  To initialize all settings except the date/time, carry out the following procedure.
  [Turn ON the power switch while holding down the RESET key]

## Perform Auto Setup

Section 4.5, "Performing Auto Setup" in the User's Manual Part 1

Voltage axis, time axis, trigger, and other settings are automatically configured according to the input signal. This is useful when you wish to quickly display the waveform or when you do not know the setup conditions because the characteristics of the input signal are unknown.

SETUP **1** Press the **SETUP** key.




**2** Press **Auto Setup**.

To return the DL750/DL750P back to the condition that existed immediately before auto setup, press here.

### Note

- When auto setup is executed, only the waveforms of the channels in which signals are being applied are displayed.
- **Modules that can be automatically setup**
  701250 (HS10M12), 701251 (HS1M16), 701255 (NONISO_10M12), 701260 (HV (with RMS)), 701261 (UNIVERSAL), 701262 (UNIVERSAL (AAF)), and 701275 (ACCL/VOLT)
- **Applicable waveforms for auto setup**
  Frequency: Approx. 50 Hz to 1 MHz
  Type: Uncomplicated repetitive waveforms

# Changing the Waveform Display Conditions

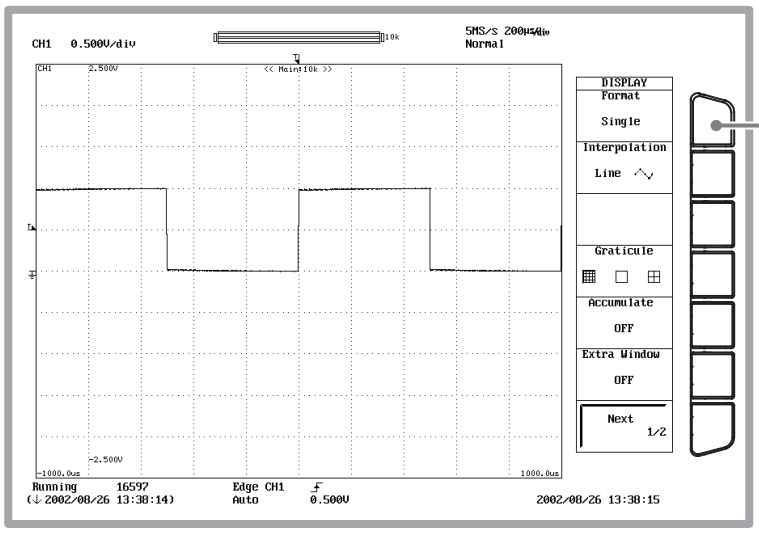
This section explains the operations used to divide the screen into windows and change settings such as the voltage sensitivity and vertical position (vertical axis) and the time axis (horizontal axis).

## Set the Number of Windows to Single

Section 8.1, "Changing the Display Format" in the User's Manual Part 1

By default, the screen is divided into 4 windows (Quad). Since only CH1 is observed in this case, the display format is set to Single.

DISPLAY **1** Press the **DISPLAY** key.

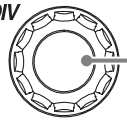



**2** Display the selection menu and select **Single**.

## Change the Voltage Sensitivity from 0.5 V/div to 0.2 V/div

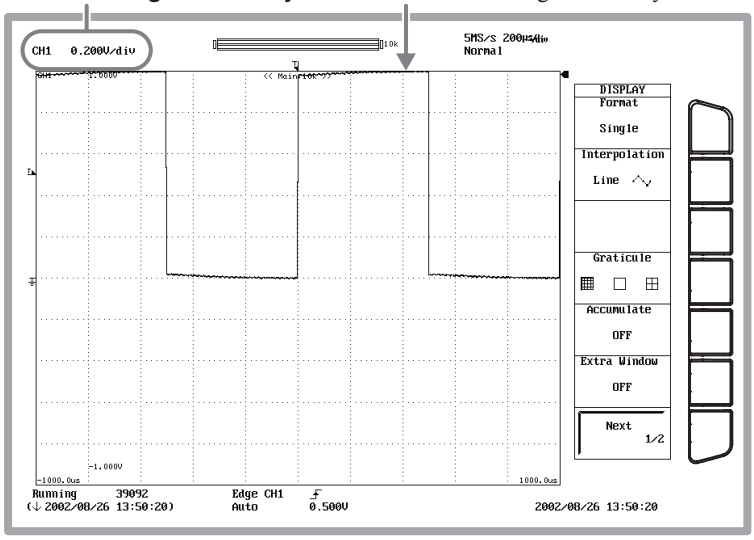
Section 5.3, "Setting V/div" in the User's Manual Part 1

V/DIV



**1** Turn the **V/DIV** knob clockwise and set the voltage sensitivity to **0.2 V/div**.

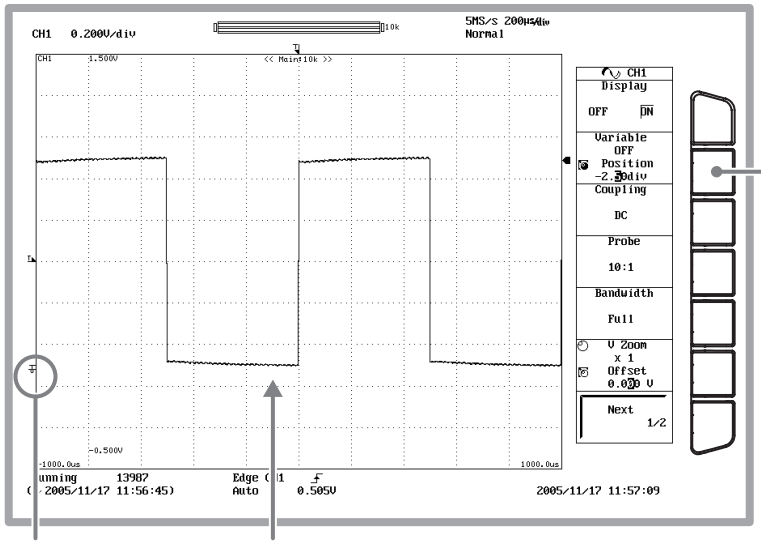
**Set the voltage sensitivity of CH1** Since the voltage sensitivity is increased, a section of the waveform goes off the display.



## Lower the Vertical Position for Viewing the Entire Waveform Amplitude

Section 5.4, "Setting the Vertical Position of Waveforms" in the User's Manual Part 1

CH 1 **1** Press the **CH 1** key.




**2** Turn the **jog shuttle** counterclockwise to set Position to **-2.50 div**.

The ground level mark also moves.

Since the vertical position was lowered, the entire amplitude of the waveform is displayed on the screen.

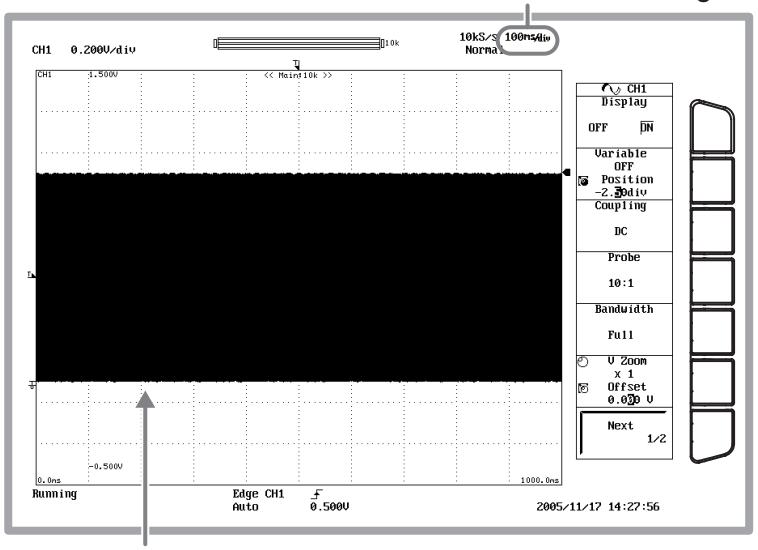
## Change the Time Axis Setting from 200 µs/div to 100 ms/div

Section 5.2, "Setting T/div" in the User's Manual Part 1

Time axis setting refers to setting of the time per division of the grid.
If the time axis setting is increased, the screen display changes from update mode in which the displayed waveforms are updated using triggers to roll mode in which the waveforms rolls from right to left on the screen.
Roll mode display is useful when observing signals with a long period or signals with slow changes.

TIME/DIV **1** Turn the **TIME/DIV** knob counterclockwise and set the time axis to **100 ms/div**.

**Time axis setting of CH1**

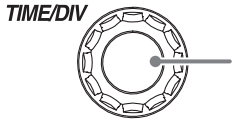



**Roll mode display**

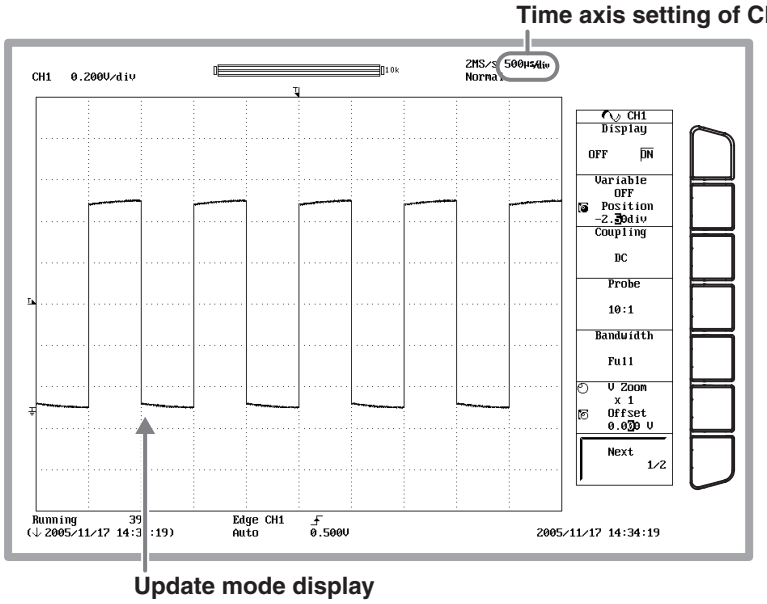
## Change the Time Axis Setting from 100 ms/div to 50 μs/div

Section 5.2, "Setting T/div" in the User's Manual Part 1

The display returns from roll mode to update mode, and 5 periods of the waveform are displayed.




**1** Turn the **TIME/DIV** knob clockwise and set the time axis to **500 μs/div**.



# Changing the Trigger Setting

*Setting the trigger* refers to the setting of the time position of the waveform to be displayed of the acquired signal waveform.
The main trigger settings are indicated below.

**Trigger type**: Triggers can be classified into *simple triggers* and *enhanced triggers*. For details, see page 10.

**Trigger source**: Sets the target signal for the selected trigger type.

**Trigger slope**: *Slope* refers to the movement of the signal from a low level to a high level (rising edge) or from a high level to a low level (falling edge). The slope is used as one of the trigger condition items. Selects whether to detect the rising edge, falling edge, or both edges.

**Trigger level**: Sets the level through which the slope of the input signal is to pass as one of the trigger conditions.

**Trigger mode**: Selects how the waveform is displayed in relation to the detection of the specified trigger slope. If auto setup is performed, the trigger mode is set to auto. For details, see section 6.1, "Setting the Trigger Mode" in the user's manual.

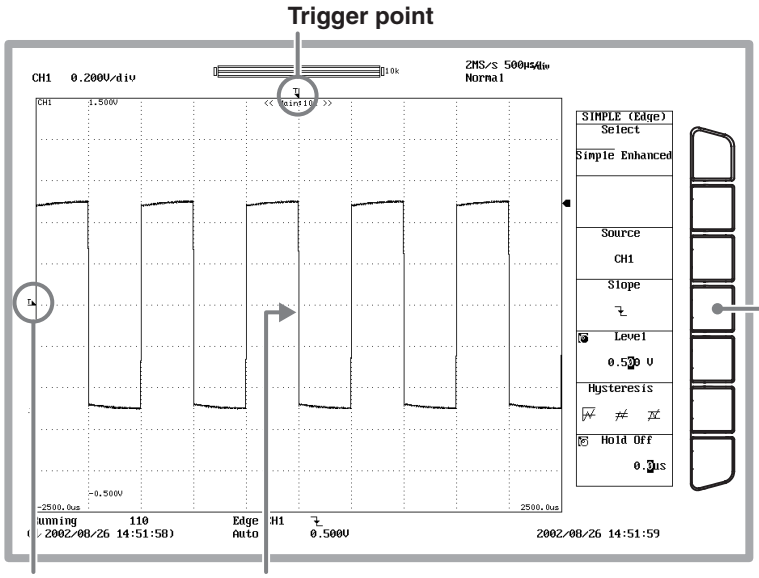
**Trigger position**: Determines the time axis position where the data is sampled when a trigger occurred (trigger point) is to be displayed. The default value is 50.0% (center of the screen).

If settings are initialized or auto setup is performed, the trigger type is set to Simple (trigger source: CH1 edge trigger (input signal trigger)). Input signal trigger activates the trigger on the rising edge, falling edge, or both edges of a single input signal.
This section explains the operation when the trigger type is left as input signal trigger and the trigger slope, trigger mode, and trigger position are changed.

## Change the Trigger Slope from Rising to Falling

Section 6.5, "Setting the Edge Trigger" in the User's Manual Part 1

SIMPLE/ENHANCED **1** Press the **SIMPLE/ENHANCED** key.



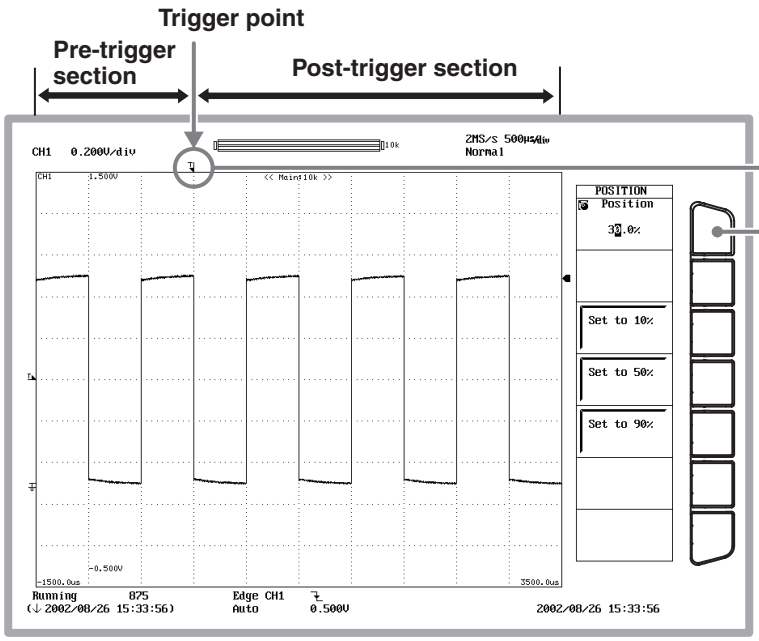

**2** Display the selection menu and select ↘ (**falling**).

## Move the Trigger Position Left by 2 div

Section 6.2, "Setting the Trigger Position" in the User's Manual Part 1

The waveform moves to the left by 2 div showing more of the section after the trigger occurrence (post-trigger section).

POSITION **1** Press the **POSITION** key.




**2** Turn the **jog shuttle** counterclockwise to set the trigger position to **30.0%**. The waveform moves 2 div to the left.

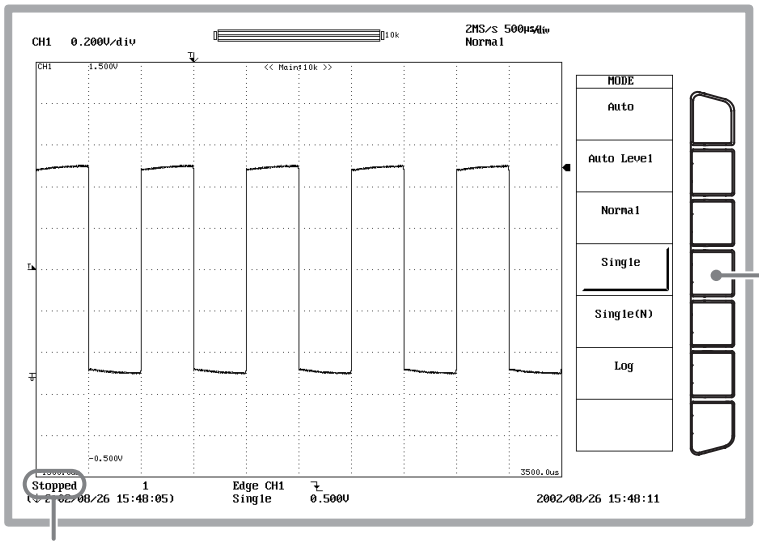
If you wish to select 10%, 50%, or 90%, you can press the corresponding soft key.

## Change the Trigger Mode from Auto to Single

Section 6.1, "Setting the Trigger Mode" in the User's Manual Part 1

In Single mode, the displayed waveforms are updated only once when a trigger is activated, then acquisition stops.
Single mode is suited for observing single shot signals.

MODE **1** Press the **MODE** key.




**2** Select **Single**.

When the waveform acquisition stops, "Running" changes to "Stopped".

# Measuring Waveforms

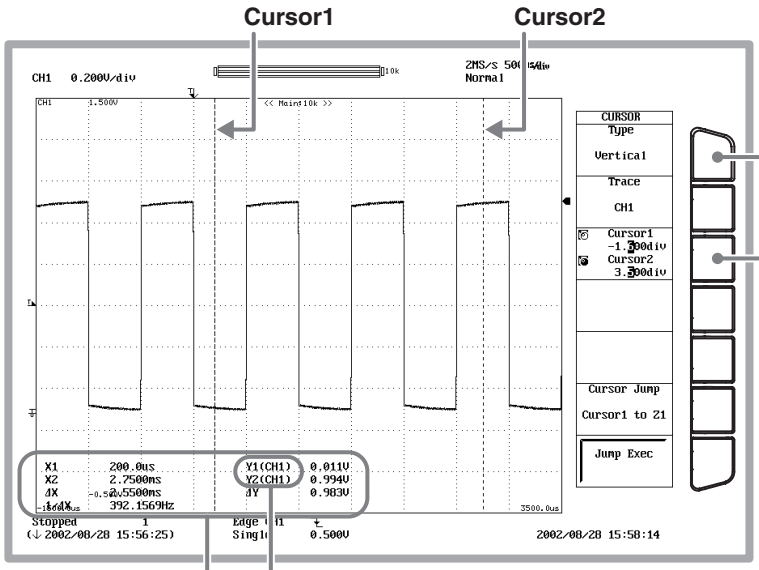
This section explains the operation for measuring the voltage and period of the displayed waveform using the vertical cursors (V cursors). Automated measurement of waveform parameters, computation, and other functions are also available for measuring pulse and other waveforms.

## Measure the Voltage Using the Vertical Cursors (V Cursors)

Section 11.5, "Measuring Waveforms Using Cursors" in the User's Manual Part 2

The voltage (Y-axis value) and time (X-axis value) at the cursor position are displayed at the lower section of the waveform display area.

CURSOR **1** Press the **CURSOR** key.




**2** Display the selection menu and select **Vertical**.

**3** Set the **jog shuttle** control to **Cursor1**.

**4** Turn the **jog shuttle** to move **Cursor1**.

**5** Likewise, move Cursor2.
If you set the jog shuttle control to both Cursor1 and Cursor2, the two cursors can be moved simultaneously.

The CH specified by trace is displayed in the parentheses.

X1: X-axis value of Cursor1
X2: X-axis value of Cursor2
ΔX: The difference between the X-axis values at Cursor1 and Cursor2
1/ΔX: The inverse of the difference between the X-axis values at Cursor1 and Cursor2
Y1: Y-axis value of Cursor1
Y2: Y-axis value of Cursor2
ΔY: The difference between the Y-axis values at Cursor1 and Cursor2

### Note

**Cursor Types**

**When X-Y waveforms are not displayed**

- **Horizontal cursor (H cursor):** Measures the Y-axis value at the cursor.
- **Vertical cursor (V cursor):** Measures the X-axis and Y-axis values at the cursor.
- **Marker cursor:** The cursor moves on the waveform data and measures the data. M1 (marker 1) to M4 (marker 4) can be specified on separate waveforms.
- **Angle cursor:** Set the measurement zero point (position of reference cursor Ref1) and the end point (position of the reference cursor Ref2) on the X-axis and assign an angle corresponding to the width of Ref1 and Ref2. Using this angle as a reference, this function measures the angle of the two angle cursors (Cursor1 and Cursor2).

**When X-Y waveforms are displayed**

- **Horizontal cursor (H cursor):** Measures the Y-axis value at the cursor.
- **Vertical cursor (V cursor):** Measures the X-axis value at the cursor.
- **H&V Cursors:** Measures the X-axis and Y-axis values at the cursor.
- **Marker cursor:** The cursor moves on the waveform data and measures the data.

# Zooming the Waveform along the Time Axis

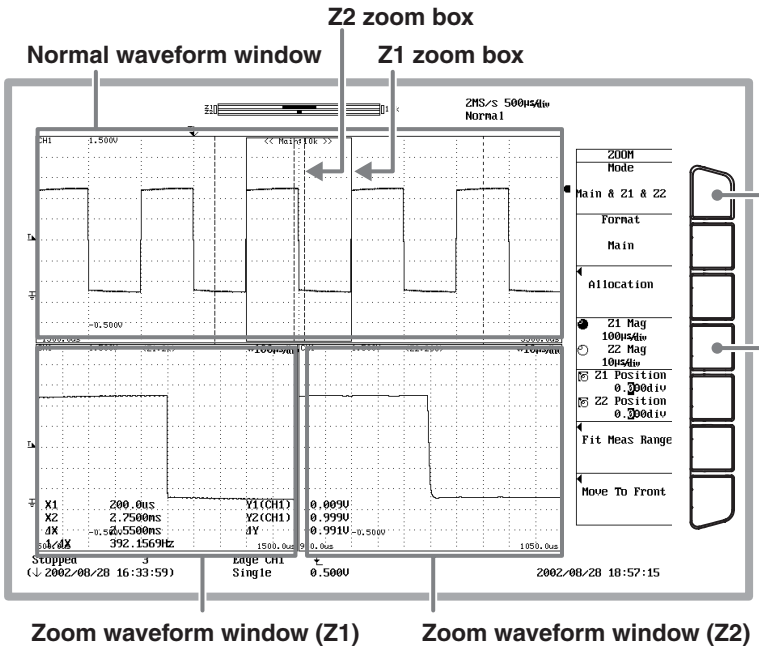
This section explains the operation for expanding along the time axis a section of the displayed waveform.
Though not explained here, waveforms can also be zoomed along the voltage axis.

## Set the Zoom Rate

Section 8.5, "Zooming the Waveform" in the User's Manual Part 1

Normal waveforms and zoomed waveforms of two locations (dual zoom) can be displayed simultaneously.
When zoom waveforms are displayed, a zoom box indicating the zoom position is displayed in the normal waveform window.

ZOOM **1** Press the **ZOOM** key.




**2** Select **Main&Z1&Z2**.

**3** Set the **jog shuttle** control to **Z1 Mag.**

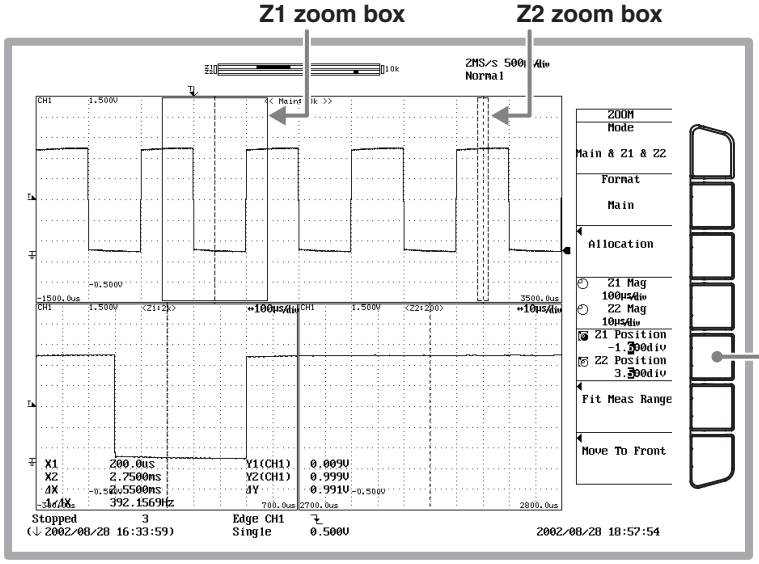
**4** Turn the **jog shuttle** to set the zoom ratio of Z1.

**5** Likewise, set Z2 Mag.
If the jog shuttle control is set to both Z1 Mag and Z2 Mag, the zoom rate of Z1 and Z2 can be set simultaneously.

## Change the Zoom Position

Section 11.5, "Measuring Waveforms Using Cursors" in the User's Manual Part 2

Move the zoom position while viewing the zoom box.




**1** Set the **jog shuttle** control to **Z1 Position**.

**2** Turn the **jog shuttle** to move the Z1 zoom box.

**3** Likewise, set Z2 Position.
If the jog shuttle control is set to both Z1 Position and Z2 Position, the zoom boxes of Z1 and Z2 can be moved simultaneously.

# Printing/Saving Waveforms

This section explains the operation for printing the displayed waveform on the built-in printer and saving the waveform on a storage medium. Printing is also possible on USB printers and network printers (/C10 option). In addition, data can be saved to various storage media.*

* Internal hard disk (/C8 option), internal storage media (floppy disk, Zip disk (DL750 only), or PC card selected at the time of purchase), storage medium of a network drive (/C10 option), or USB storage medium. Only on models supporting USB storage devices (see section 13.3 in the User's Manual Part 2)

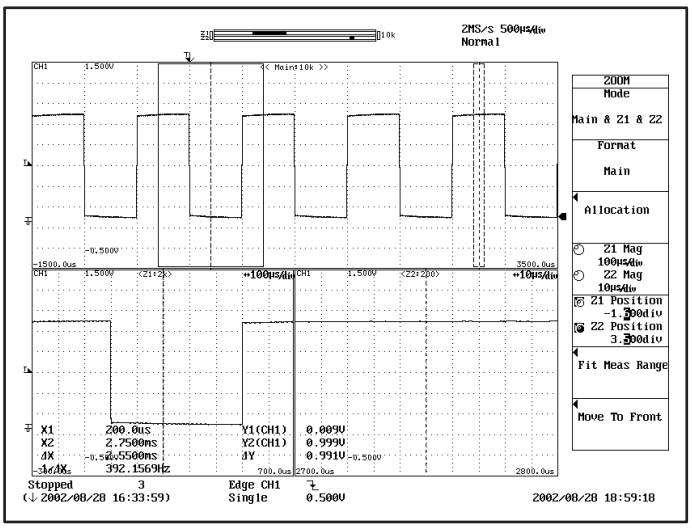
## Print the Screen Image Data on the Built-in Printer

Section 12.2, "Printing Using the Built-in Printer" in the User's Manual Part 2

Waveforms displayed on the screen are printed as shown. Before printing, install a roll paper in the built-in printer according to the procedures given in section 12.1 (9.1 for the DL750P) in the user's manual.

PRINT **1** Press the **PRINT** key.
Printing is executed.

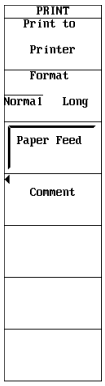
**Output example**




### Note

Pressing the SHIFT key followed by the PRINT key displays the PRINT menu. Though not required in the procedures given in this operation guide, you can set the print destination (built-in printer, USB printer, or network printer), the output format, the comment that is displayed at the lower section of the image data, and other settings.

**PRINT menu**



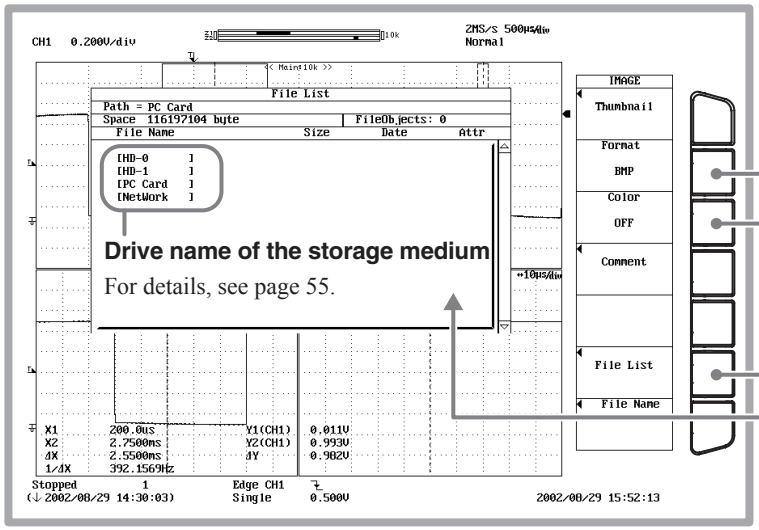

## Save the Screen Image Data to a Specified Storage Medium

Section 13.11, "Saving Screen Image Data" in the User's Manual Part 2

The image is saved to the storage medium as shown on the screen.

SHIFT + IMAGE SAVE Press the **SHIFT** key to illuminate.

**1** Press the **SHIFT** key followed by the **IMAGE SAVE** key.




**2** Display the selection menu and select the output format.

**3** Select the color.
(when a setting other than PostScript is selected in step 2)

**4** Display the File List.

**5** Turn the **jog shuttle** to select the save destination medium.

**6** Press the **SELECT** key to confirm the selection.

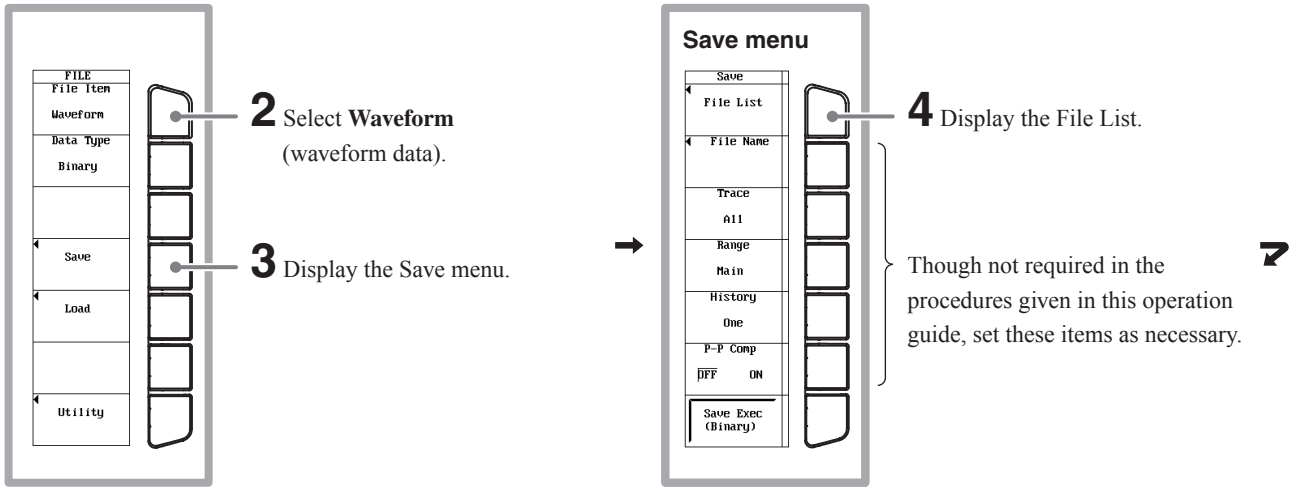
IMAGE SAVE **7** Press the **IMAGE SAVE** key again.
The save operation is executed.

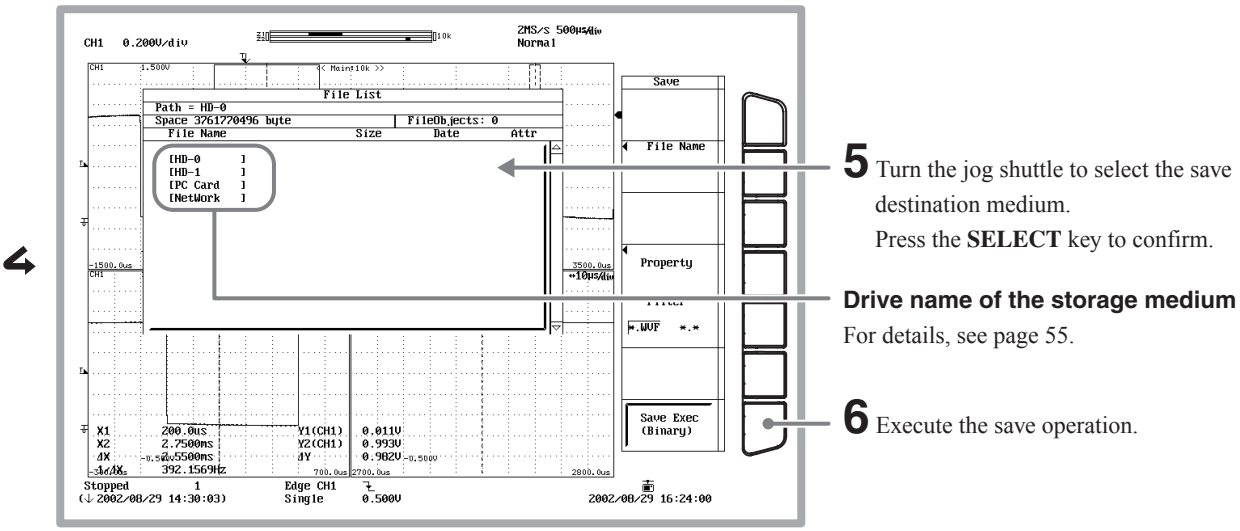
# Save the Waveform Data to a Specified Storage Medium

Section 13.7, "Saving/Loading the Waveform Data" in the User's Manual Part 2

Saves the data of the waveform displayed on the screen to the storage medium. When the save operation is executed, the setup data of the vertical axis, horizontal axis, and trigger of the saved waveform are also saved.

FILE **1** Press the **FILE** key.



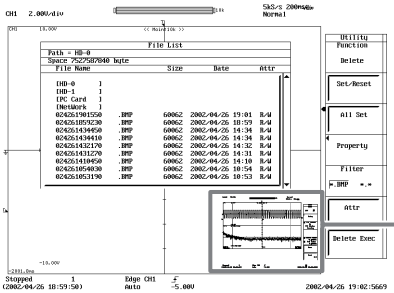




## Tip

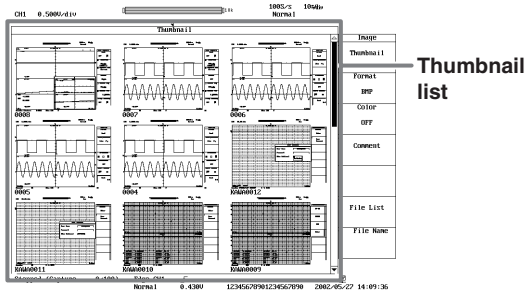
### Thumbnail Display of Screen Image Data

Section 13.12, "Displaying Thumbnails of the Saved Screen Image Data" in the User's Manual Part 2

Thumbnails (reduced and simplified images) of the saved screen image data can be displayed on the screen.
This feature is useful for checking the contents of the stored data.




On the FILE or IMAGE menu, select a file from the File List and press the SELECT key.



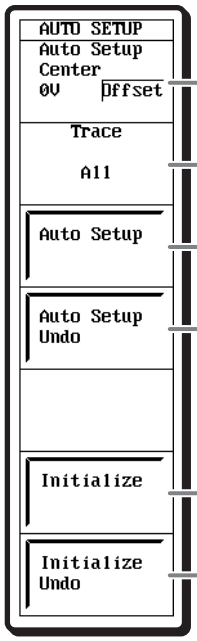

On the IMAGE menu, press the Thumbnail soft key.

# Setup Menu Items

For details on each menu, see the chapter or section in the user's manual Part 1 or Part 2 indicted by the ▶ mark.

## SETUP (CAL)

SETUP
CAL




Center position after auto setup
Selects whether the center position after auto setup is set to 0 V or the offset value.

Auto setup target channel
Select the target channel for the auto setup.

**Execute auto setup** ▶Section 4.5
Automatically sets the settings such as V/div, T/div, and trigger level that are appropriate for the input signal.

Cancel auto setup

**Execute initialization** ▶Section 4.4
Initializes the settings to factory default.

Cancel initialization

**Note**

**Applicable Waveforms for Auto Setup**

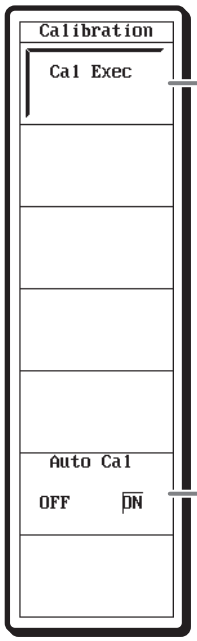
Auto setup can be performed on the following waveform.

**Frequency:** Approx. 50 Hz to 1 MHz

**Input voltage magnitude:** Up to approx. 20 mV when the probe attenuation is 1:1

**Type:** Repetitive waveform (that is not complex)

SHIFT + SETUP
CAL




**Execute calibration** ▶Section 4.6

Turn ON/OFF auto calibration

**Note**

**Calibration**

The following parameters are calibrated. Perform calibration when you wish to measure waveforms with high accuracy.

- Ground level offset
- Gain of the A/D converter

**Auto Calibration**

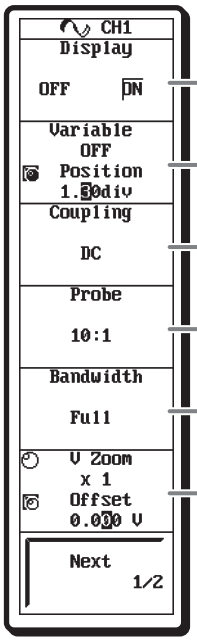
If Auto Cal is set to ON, auto calibration is performed the first time the time axis setting (T/div) is changed or the first time measurement is started after the time shown below passes. After turning ON the power

- 3 minutes pass
- 10 minutes pass
- Every 30 minutes from here on after

# CH1 to CH16 (LOGIC, EVENT, DSP)

CH 1 to CH 16

• The following figure shows the menu for the channels that have Voltage Modules (see Note on this page) installed.




**Turn ON/OFF the channel** ▶ Section 5.1

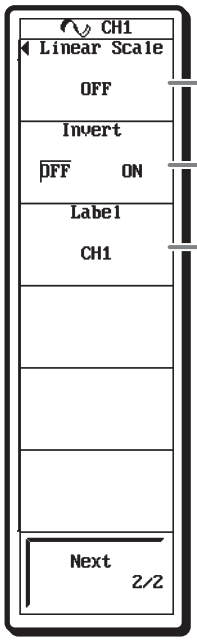
Variable/Position ▶ Sections 5.4 and 5.9
Turn Variable ON to set the upper and lower limits of the vertical axis according to the displayed waveform and zoom or expand the waveform vertically. When Variable is turned OFF, the vertical position of the waveform can be specified.

**Input coupling** ▶ Section 5.5
Select the method of coupling the input signal to the vertical control circuit from AC and DC. To check the ground level, select GND. To measure rms values using the 701260, select AC-RMS or DC-RMS. To measure the temperature using the 701261, 701262, or 701265 (see the next page), select TC. Select ACCL when measuring acceleration on the 701275 (see page 32).

**Probe type** ▶ Section 5.6
Select the voltage probe attenuation or current probe output rate according to the type of probe used.

Bandwidth ▶ Section 5.7
Select the high frequency band to be removed from the input signal.

Vertical Zoom/Expand and Offset
▶ Sections 5.8 and 5.10
Set the magnification and display range when waveforms are zoomed/expanded vertically and the offset voltage.




Turn ON/OFF linear scaling ▶ Section 5.11
Set the method of scaling the measured values. Select OFF when not scaling.

Turn ON/OFF inverted waveform display
▶ Section 5.12

Waveform label ▶ Section 8.10
You can arbitrary set the waveform label using up to eight characters.

## Note

**Voltage Modules**

- **High-Speed 10 MS/s, 12-Bit Isolation Module**
  MODEL: 701250, abbreviated name: HS10M12
- **High-Speed High-Resolution 1 MS/s, 16-Bit Isolation Module**
  MODEL: 701251, abbreviated name: HS10M16
- **High-Speed 10 MS/s, 12-Bit Non-Isolation Module**
  MODEL: 701255, abbreviated name: NONISO_10M12
- **High-Voltage 100 kS/s, 16-Bit Isolation Module (with RMS)**
  MODEL: 701260, abbreviated name: HV (with RMS)
- **Universal (Voltage/Temp.) Module (Only When Measuring Voltage)**
  MODEL: 701261, abbreviated name: UNIVERSAL
- **Universal (Voltage/Temp.) Module (with AAF) (Only When Measuring Voltage)**
  MODEL: 701262, abbreviated name: UNIVERSAL (AAF)
- **Temperature, High Precision Voltage Isolation Module**
  (only when measuring voltage)
  MODEL: 701265, abbreviated name: TEMP/HPV
- **Acceleration/Voltage Module (with AAF)**
  MODEL: 701275, abbreviated name: ACCL/VOLT

## Note

**Zoom/Expand Vertically**

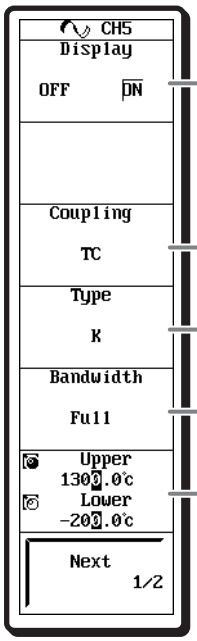
The following two methods are available.

- **Zooming in or out by setting the magnification**
  You can expand or reduce the waveform display vertically by a factor in the range of ×0.1 to ×100. The waveform display can be zoomed around the vertical position.
- **Zooming vertically according to the upper and lower limits of the display range**
  You can zoom in on the desired section of the observed waveform by specifying the upper and lower limits of the vertical axis to change the display range to a narrower range for each displayed waveform. Conversely, you can widen the display range to view waveforms outside the display range.

### CH1 to CH16

CH 1 to CH 16

- The following figure shows the menu that appears when measuring temperature on channels with the Universal (Voltage/Temp.) Modules (MODEL: 701261, abbreviated name: UNIVERSAL), Universal (Voltage/Temp.) Modules (with AAF) (MODEL: 701262, abbreviated name: UNIVERSAL (AAF)), or Temperature, High Precision Voltage Isolation Modules (MODEL: 701265, abbreviated name: TEMP/HPV) installed.




**Turn ON/OFF the channel** ▶ Section 5.1

**Input coupling** ▶ Section 5.5
To measure temperature, select TC. To measure voltage (see the previous page), select DC. To check the ground level, select GND.

**Thermocouple type** ▶ Section 5.16
Select the type of thermocouple to be used from K, E, J, T, L, U, R, S, B, N, W, and Au7Fe.

Bandwidth ▶ Section 5.7
Select the high frequency band to be removed from the input signal.

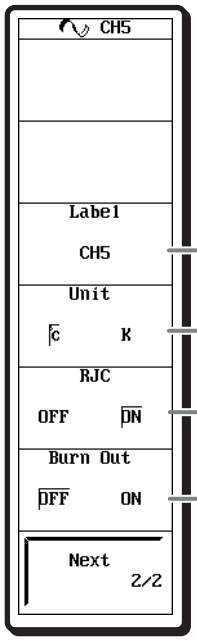
Upper and lower limits of the display range ▶ Section 5.9
Set the upper and lower limits of the display range when displaying measured waveforms on the screen. The selectable range is –5432 to 5432 [°C, K, or °F].

**Note**

**Thermocouple Type and Measurement Range**

The following 12 types of thermocouples are available.

- K: –200 to 1300 [°C]
- E: –200 to 800 [°C]
- J: –200 to 1100 [°C]
- T: –200 to 400 [°C]
- L: –200 to 900 [°C]
- U: –200 to 400 [°C]
- R: 0 to 1700 [°C]
- S: 0 to 1700 [°C]
- B: 400 to 1800 [°C]
- N: 0 to 1300 [°C]
- W: 0 to 2300 [°C]
- Au7Fe: 0 to 300 [K]




Waveform label ▶ Section 8.10
You can arbitrary set the waveform label using up to eight characters.

Unit ▶ Section 5.16
You can set the temperature unit to °C, K, or °F.

RJC ▶ Section 5.16
Select whether to perform reference junction compensation by the internal RJC circuit (ON/OFF).

Burnout ▶ Section 5.16
Set the behavior when the thermocouple input detects a burnout. Select whether to fix the measured value at the upper limit of the measurement range of the respective thermocouple when a burnout is detected (ON) or not detect a burnout (OFF).

**Note**

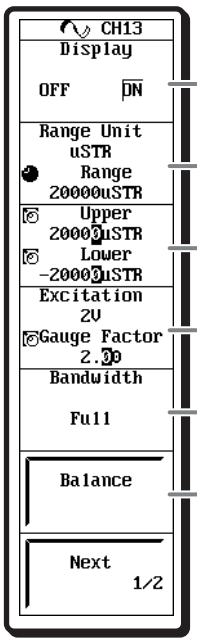
**Reference Junction Compensation (RJC)**

The DL750/DL750P normally performs reference junction compensation with the built-in RJC circuit when measuring temperature with the thermocouple. When checking the temperature measurement value, or when using an external reference junction (0°C), the internal reference junction compensation needs to be disabled (RJC setting must be turned OFF).

**CH1 to CH16**

CH 1 to CH 16

- The following figure shows the menu for the channels that have Strain Modules (see Note on this page) installed.




**Turn ON/OFF the channel** ▶ Section 5.1

**Measurement range/unit** ▶ Section 5.17
Set the unit of the measurement range to the unit of strain (μSTR) or the output value of the strain gauge transducer (mV/V). If you selected μSTR, select the measurement range from 500 μSTR to 20000 μSTR; if you selected mV/V, select the measurement range from 0.25 mV/V to 10 mV/V.

Upper and lower limits of the display range ▶ Section 5.17
Set the upper and lower limits of the display range according to the input for easier viewing of the measured waveforms.

**Bridge voltage and gauge factor** ▶ Section 5.17
Set the voltage applied to the bridge head (2 V, 5 V, or 10 V) or set the gauge factor of the strain gauge.

Bandwidth ▶ Section 5.7
Select the high frequency band to be removed from the input signal.

**Execute balance** ▶ Section 5.17
Automatically compensate the unbalanced portion of the bridge resistance.

**Note**

**Strain Module**

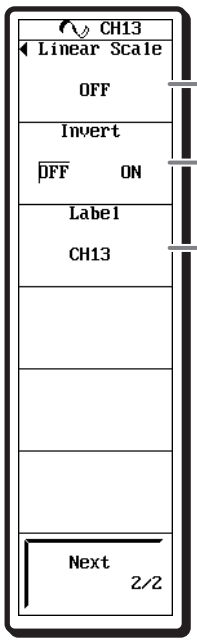
- **Strain Module (NDIS)**
  MODEL: 701270, abbreviated name: STRAIN_NDIS
- **Strain Module (DSUB, Shunt-Cal)**
  MODEL: 701271, abbreviated name: STRAIN_DSUB

**Bridge Voltage**

- 2 V: When the bridge resistance is 120 Ω to 1000 Ω
- 5 V: When the bridge resistance is 350 Ω to 1000 Ω
- 10 V: When the bridge resistance is 350 Ω to 1000 Ω

**Gauge Factor**

Selectable range: 1.90 to 2.20 (the resolution is 0.01)




**Turn ON/OFF linear scaling, shunt calibration** ▶ Sections 5.11 and 5.17
Set the method of scaling the measured values. Select OFF when not scaling. On the Strain Module (DSUB, Shunt-Cal), a shunt calibration execution menu appears when Shunt is selected.

Turn ON/OFF inverted wafevorm display ▶ Section 5.12

Waveform label ▶ Section 8.10
You can arbitrary set the waveform label using up to eight characters.

**Note**

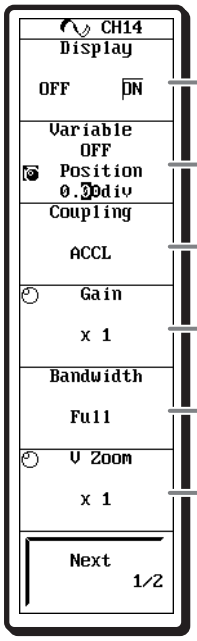
**Shunt Calibration**

Shunt calibration is a function for correcting the gain of the strain measurement by connecting a known resistance (shunt resistance) to the strain gauge in parallel. The Strain Module (DSUB, Shunt-Cal) has a built-in relay circuit for turning ON/OFF the shunt resistor connection. To execute shunt calibration, a bridge head that supports shunt calibration (701957 or 701958) is needed.

### CH1 to CH16

CH 1 to CH 16

- The figure below shows the menu of the channel in which the acceleration/voltage module (701275 (ACCL/VOLT)) is installed.




**Turn ON/OFF the channel** ▶ Section 5.1

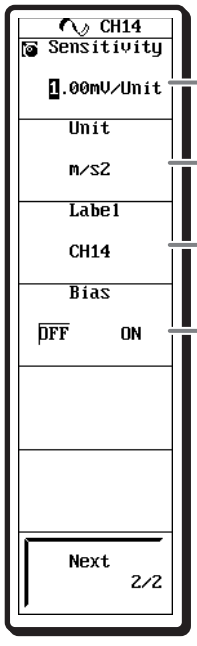
Variable/Position ▶ Sections 5.4 and 5.9
Turn Variable ON to set the upper and lower limits of the vertical axis according to the displayed waveform and zoom or expand the waveform vertically. When Variable is turned OFF, the vertical position of the waveform can be specified.

**Input coupling** ▶ Section 5.5
To measure acceleration, select ACCL. To measure voltage (see the page 29), select DC. To check the ground level, select GND.

**Gain** ▶ Section 5.18
Set the ratio of the output signal with respect to the input signal in the range of ×0.1 to ×100.

Bandwidth ▶ Section 5.7
Select the high frequency band to be removed from the input signal.

Vertical zoom/expand ▶ Section 5.8
Set the magnification and display range when waveforms are zoomed/expanded vertically.




**Sensitivity** ▶ Sections 5.11 and 5.17
Set the sensitivity of the acceleration sensor in the range of 0.10 to 2000.00 mV/Unit.

Unit ▶ Section 5.12
Enter the acceleration unit. The default setting is $m/s^2$.

Waveform label ▶ Section 8.10
You can arbitrary set the waveform label using up to eight characters.

**Bias** ▶ Section 5.18
Select whether to supply 4-mA current to the acceleration sensors. Turn ON this setting after connecting the acceleration sensors to the acceleration/voltage module (see the note above).

**Note**

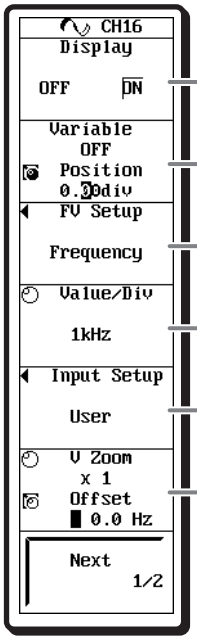
**Connecting Acceleration Sensors**

The DL750/DL750P allows built-in amplifier type (low impedance) acceleration sensors to be directly connected to the acceleration/voltage module. To connect built-in amplifier type acceleration sensors, use BNC cables (that are compatible with the acceleration sensors). Connect acceleration sensors with the supply current (bias) to them turned OFF. After connection, turn ON the supply current to the acceleration sensors for making measurements.

**CH1 to CH16**

CH 1 to CH 16

- The figure below shows the menu of the channel in which the frequency module (701280 (FREQ)) is installed.




**Turn ON/OFF the channel** ▶ Section 5.1

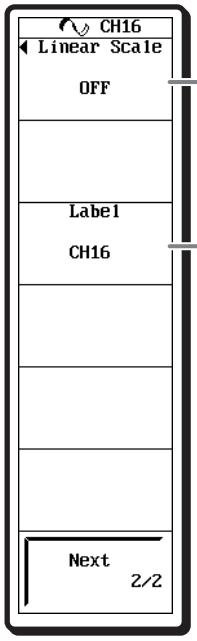
Variable/Position ▶ Sections 5.4 and 5.9
Turn Variable ON to set the upper and lower limits of the vertical axis according to the displayed waveform and zoom or expand the waveform vertically. When Variable is turned OFF, the vertical position of the waveform can be specified.

**FV setting** ▶ Section 5.19
Select the function from nine measurement parameters. For each measurement parameter that is selected, set the smoothing filter, pulse average, deceleration/stop prediction, and so on.

**Value/Div** ▶ Section 5.19
Set the value per division along the vertical axis. The selectable range and unit vary depending on the measurement parameter. You can also set the value using the V/DIV knob.

**Input setting** ▶ Section 5.19
Enter settings related to the input such as the voltage range, input coupling, probe type, bandwidth limit, threshold level, hysteresis, slope, chatter elimination function ON/OFF, and pull-up ON/OFF. When you select a preset, the input is set to values appropriate for the signal.

Vertical Zoom/Expand and Offset
▶ Sections 5.8 and 5.10
Set the magnification and display range when waveforms are zoomed/expanded vertically and the offset voltage.




Turn ON/OFF linear scaling ▶ Section 5.11
Set the method of scaling the measured values. Select OFF when not scaling.

Waveform label ▶ Section 8.10
You can arbitrary set the waveform label using up to eight characters.

**Note**

**Measurement Parameters of the Frequency Module**

The following nine parameters can be measured on the frequency module.

- Frequenc y [Hz]
- Re volution [rpm]
- Re volution [rps]
- Period [s]
- Power Freq.: Power supply frequency [Hz]
- Duty: Duty cycle [%]
- Pulse Width [s]
- Pulse Integration (distance and flow rate)
- Velocity [km/h, m/s]

**Note**

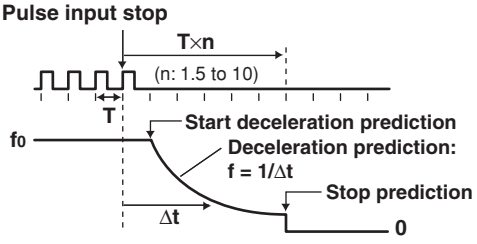
**Deceleration Prediction**

Automatically predicts the deceleration from the elapsed time (Δt) after the pulse input stops. The deceleration prediction starts after a pulse period (T) of the pulse one period before the pulse input stopped elapses after the pulse input stopped.

**Stop Prediction**

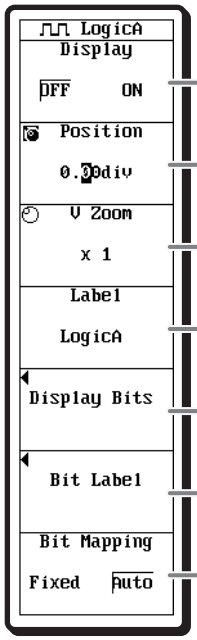
The function determines the stop point at a constant time after the pulse input stops, and the frequency is set to 0. Set the time (T×n) by specifying ×n (where n = 1.5 to 10) of the pulse period (T) of the pulse one period before the pulse input stopped.

**Pulse input stop**



**CH1 to CH16(LOGIC, EVENT)**

SHIFT + CH 9 (LOGIC A) or CH 10 (LOGIC B)




**Turn ON/OFF logic waveforms**
▶ Section 5.20

Position
Set the vertical position of the waveform.

Vertical zoom/expand
Set the magnification when waveforms are zoomed/expanded vertically.

Label
Set labels for logic inputs A and B using up to 8 characters.

Turn ON/OFF bit display
Specify whether to display the data by bits.

Label for each bit
Set the label for each bit using up to 8 characters.

Bit display position
Select whether to display the waveform of each bit at a fixed position (Fixed) or display only the bits that are turned ON in order from the top (Auto).

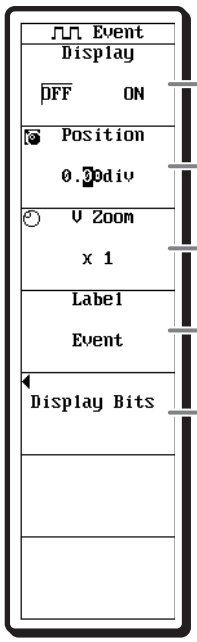
**Note**

**Differences in the Bit Display Position**

Example when bit 7 is OFF:

| Fixed | Auto |
|---|---|
| A1 | A1 |
| A2 | A2 |
| A3 | A3 |
| A4 | A4 |
| A5 | A5 |
| A6 | A6 |
| | A8 |
| A8 | |

SHIFT + CH 11 (EVENT)




**Turn ON/OFF the event waveform display**
▶ Section 5.21

Position
Set the vertical position of the waveform.

Vertical zoom/expand
Set the magnification when waveforms are zoomed/expanded vertically.

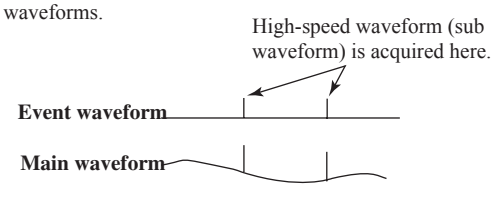
Label
Set the label for the event waveform using up to 8 characters.

Select and turn ON/OFF the event waveform display
Select the event waveform to be displayed and turn ON/OFF each waveform.

**Note**

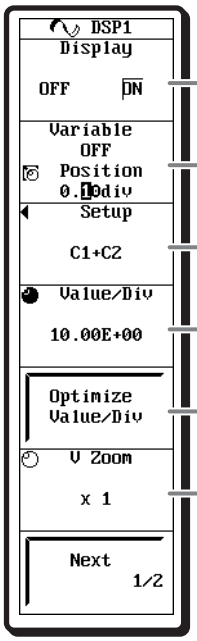
**Event Waveforms**

When using the dual capture function, the times when triggers are activated can be displayed as event waveforms.



**CH1 to CH16(DSP)**

SHIFT + CH 1 (DSP 1) to CH 6 (DSP 6)




**Turn ON/OFF the channel** ▶ Section 5.1

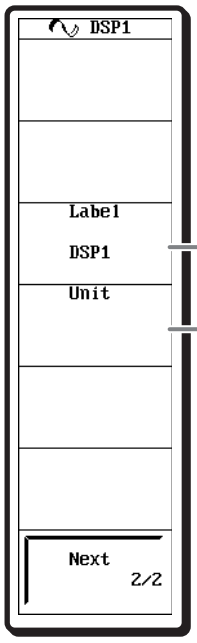
Variable/Position ▶ Sections 5.4 and 5.9
Turn Variable ON to set the upper and lo wer limits of the v ertical axis according to the displayed w aveform and zoom or e xpand the waveform v ertically. When Variable is turned OFF, the vertical position of the w aveform can be specified.

**Set computation on DSP channels**
▶ Sections 15.2 to 15.6
Enters settings such as defining the computation on DSP channels and computation channels.

**Value/Div** ▶ Sections 15.2 to 15.6
The unit of the computed result of DSP channels is Value/Div, because the result may not necessary be a v oltage [V] depending on the def inition of the selected computation. Normally, the V/DIV knob is used, but you can also use this menu set the value.

**Range optimization**
▶ Sections 15.2 to 15.6
From 123 Value/Div settings that are available, the optimum Value/Div is automatically selected, and the value is displayed.

Vertical zoom/expand
▶ Sections 5.8 and 5.9
Set the magnification and display range when waveforms are zoomed/expanded vertically.




Waveform label ▶ Section 8.10
You can arbitrary set the waveform label using up to eight characters.

Unit ▶ Sections 15.2 to 15.6
You can arbitrary set the unit using up to four characters.

## Note

**DSP Channel (/G3 Option)**

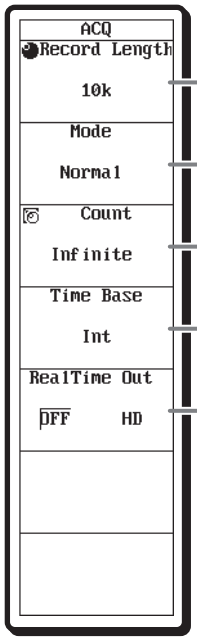
DSP (Digital Signal Processor) channels are used to perform computations between channels and filter computations in realtime using the output data of the input module as the source.

**Computation That Can Be Executed on DSP Channels**

- Addition, subtraction, multiplication, and division (+, –, ×, and ÷)
  Addition, subtraction, multiplication, and division can be performed between channels.
- Digital filter
  A digital filter is used to perform the computation. Four types of digital filters (Gauss, Sharp, IIR (Butterworth), and Mean (Moving Average)) are available.
- Differentiation and integration
  Differentiation or integration is performed on the specified waveform.
- Addition, subtraction, multiplication, and division (+, –, ×, and ÷) with coefficients
  Addition, subtraction, multiplication, and division with coefficients can be performed between channels.
- Knocking filter
  When the value of the computed channel is greater than the elimination level, filter computation is performed. If the value is less than the elimination level, the computed result is set to 0.

# ACQ

ACQ




**Record length** ▶Section 7.2
Select the number of data points to be stored in the acquisition memory.
(10 k = 10000 points)

**Acquisition mode** ▶Section 7.3
Select the processing method when waveform data is stored to the acquisition memory from Normal, Average, Envelope, and Box Average.

Number of Acquisitions ▶Section 7.3
Set the number of times waveform data is stored to the acquisition memory.

Time base ▶Section 5.14
Select whether the clock signal used as a period reference when sampling waveform data is set to a internal signal or a external signal.

Realtime recording ▶Section 7.7
Select whether to record waveform data in realtime to the internal hard disk (optional).

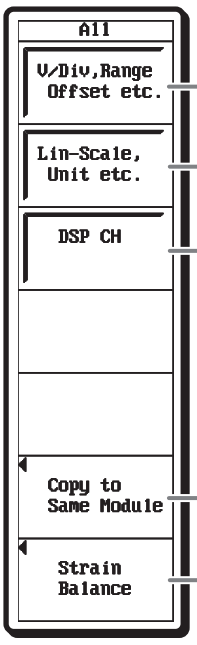
## Note

**Acquisition Mode**

- **Normal**
  In this mode, sampled data are stored in the acquisition memory without processing.
- **Average**
  The DL750/DL750P takes the linear or exponential average of the waveform data and stores the results into the acquisition memory. The averaged data is then used to generate the display.
- **Envelope**
  The maximum and minimum values are determined at every time interval from the data sampled at the maximum sample rate of each input module. The time interval used to determine the values is equal to the sample rate of the normal mode. The maximum and minimum values are paired and stored in the acquisition memory.
- **Box Average**
  Valid only on the 701250 (HS10M12) and 701255 (NONISO_10M12). The rolling average of the data sampled at the maximum sample rate of each module is determined. The resultant data is stored in the acquisition memory and used to generate the display.

# ALL CH

ALL CH




Display V/div (range), offset, etc.
▶Section 5.13
Displays settings such as V/div (range) and offset in a list (the values can be changed on the list).

Display linear scale, unit, etc.
Displays settings such as linear scale and unit in a list (the values can be changed on the list).

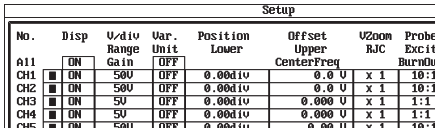
DSP channel (/G3 option) display
Displays the settings of DSP channels in a modifiable list.

Execute copy to the same type of module
When copying the setup data to the same type of module, select the copy source channel and execute the copy operation.

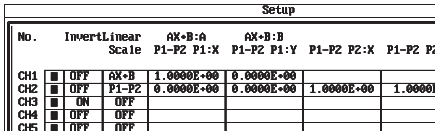
Strain balance
Execute balance on channels with Strain Modules (see page 31 in this guide) installed.

## Note

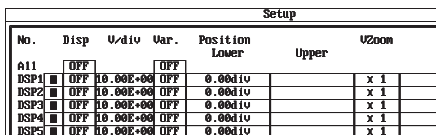
**List of V/div (Range), Offset, etc.**


Setup
No. Disp V/div Range Var. Unit Position Lower Offset Upper VZoom RJC Probe Excit
All ON Gain OFF CenterFreq BurnOu
CH1 ON 50V OFF 0.00div 0.0 V x 1 10:1
CH2 ON 50V OFF 0.00div 0.0 V x 1 10:1
CH3 ON 5V OFF 0.00div 0.000 V x 1 1:1
CH4 ON 5V OFF 0.00div 0.000 V x 1 1:1

**List of Linear Scale, Unit, etc.**


Setup
No. Invert Linear Scale AX+B:A P1-P2 P1:X AX+B:B P1-P2 P1:Y P1-P2 P2:X P1-P2
CH1 OFF AX+B 1.0000E+00 0.0000E+00
CH2 OFF P1-P2 0.0000E+00 0.0000E+00 1.0000E+00 1.0000
CH3 ON OFF
CH4 OFF OFF
CH5 OFF OFF

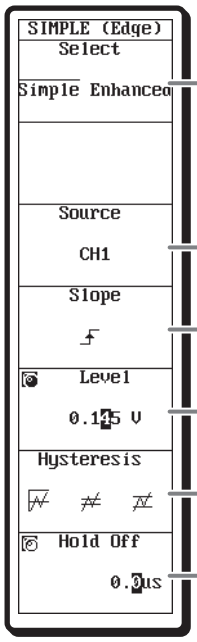
**List of DSP Channels (/G3 Option)**


Setup
No. Disp V/div Var. Position Lower Upper VZoom
All OFF OFF
DSP1 OFF 10.00E+00 OFF 0.00div x 1
DSP2 OFF 10.00E+00 OFF 0.00div x 1
DSP3 OFF 10.00E+00 OFF 0.00div x 1
DSP4 OFF 10.00E+00 OFF 0.00div x 1
DSP5 OFF 10.00E+00 OFF 0.00div x 1

# SIMPLE/ENHANCED

SIMPLE/ENHANCED

• The following figure shows the menu that appears when the trigger type is set to simple trigger.




**Trigger type** ▶ Chapter 6
Select simple trigger.

**Trigger source**
Select the trigger source from the input signal (CH1 to CH16, LOGIC A, or LOGIC B, DSP1 to DSP6 (/G3 option)), external input signal (Ext), power supply signal (Line), or time.

**Trigger slope**
Select the trigger slope from rising, falling, and both rising and falling.

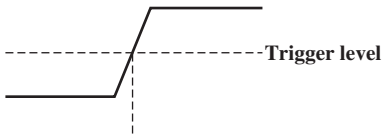
**Trigger level**
Set the level at which the trigger slope is to pass.

Trigger hysteresis
Select the hysteresis width, which is used set a trigger level width to prevent triggers from being activated on small changes in the trigger source signal.

Hold off ▶ Section 6.4
Set the time during which the trigger detection operation is temporarily paused.

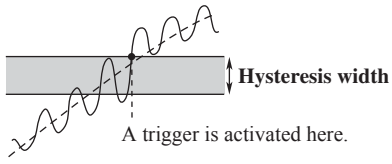
**Note**

**Trigger Slope and Trigger Level**

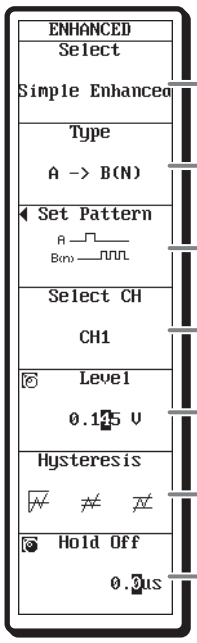



When the trigger slope is set to rising ( ), a trigger is activated here.

**Trigger Hysteresis**




• The following figure shows the menu that appears when the trigger type is set to enhanced trigger.




**Trigger type** ▶ Chapter 6
Select enhanced trigger.

**Enhanced trigger type**
Select the enhanced trigger type.

**Set the pattern**
Set the signal pattern used to activate the trigger according to the selected trigger type.

**Trigger level setting channel**
Select the channel on which the trigger level is to be set.

**Trigger level**

Trigger hysteresis

Hold off ▶ Section 6.4

**Note**

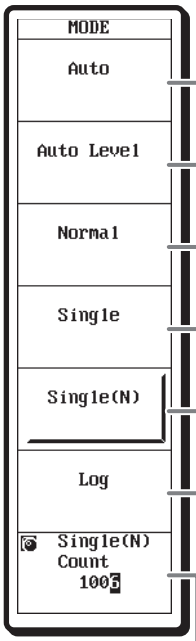
**Enhanced Trigger Types**

- **A→B(N)**
  A trigger is activated the Nth time condition B becomes true after condition A has become true.
- **A Delay B**
  This function activates a trigger the first time condition B becomes true after condition A has become true and the preset time has elapsed.
- **Edge on A**
  A trigger is activated when an edge trigger is detected on any of the channels set to edge trigger while condition A is true.
- **OR**
  A trigger is activated when any of the channels set to edge trigger meets the condition.
- **B > Time, B < Time, B TimeOut**
  A trigger is activated on the falling or rising edge of the pulse when the pulse width (width over which condition B is met) exceeds (or drops below) the preset time. In the case of a Time out trigger, a trigger is activated when the preset time elapses.
- **Period**
  A trigger is activated by measuring the pulse period (period from the time condition T is met to the next time when condition T is met).
- **Window**
  A certain voltage range (window) is set and a trigger is activated when the trigger source level enters this voltage range (IN) or exits from this voltage range (OUT).
- **Wave Window**
  Trigger for monitoring the power supply waveforms. It detects abnormalities in the power supply (disruption, sag, serge, frequency fluctuation, and voltage drop). Applicable waveforms are AC waveforms whose frequency is between 40 to 1000 Hz. A trigger is activated when the waveform deviates from the reference waveform (see page 10 in this guide).

# MODE (ACTION)

MODE

ACTION




**Auto mode** ▶ Section 6.1
If the trigger condition is met within the timeout period (approximately 50 ms), the waveform is updated on each trigger occurrence. If the trigger condition is not met after the timeout period elapses, the waveform is automatically updated.

Auto level mode ▶ Section 6.1
Within the timeout period (approximately 1 s), the waveforms are displayed in the same fashion as in the auto mode. If a trigger is not activated within the timeout period, then the center value of the amplitude of the trigger source is detected, and the trigger level is changed to that value. A trigger is activated using the new value, and the displayed waveforms are updated.

**Normal mode** ▶ Section 6.1
The waveform display is updated only when the trigger conditions are met.

**Single mode** ▶ Section 6.1
The display is updated once when the trigger conditions are met and the waveform acquisition stops.

Single (N) mode ▶ Section 7.5
When the trigger conditions are met, waveform acquisition is repeated the specified number of times, and the waveform acquisition stops. After waveform acquisition is finished, all the waveforms are displayed.

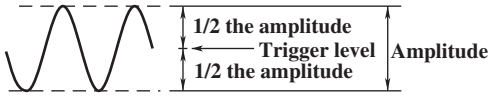
**Log mode** ▶ Section 6.1
In this mode, the trigger settings are disabled. The specified record length of data is acquired once when acquisition is started, and the displayed waveforms are updated.

Single (N) count ▶ Section 7.5
Set the number of waveform acquisitions for single (N) mode.

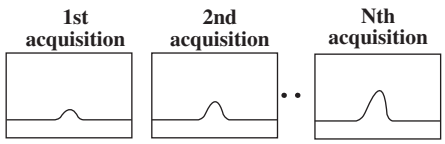
## Note

**Auto Level Mode and Single (N) Mode**

- **Auto Level Mode**




- **Single (N) Mode**

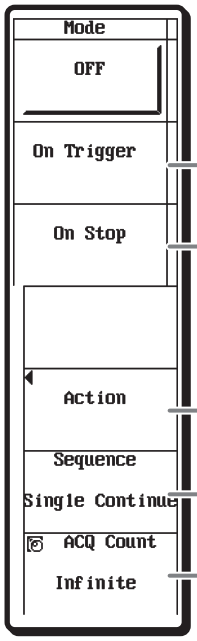



**Trigger Mode during DL750P Recorder Mode**

If Chart Recorder mode (see page 56) is selected on the DL750P, select the trigger mode from Auto, Log, Single, and Repeat. If X-Y Recorder mode is selected, the trigger mode cannot be set.

SHIFT + MODE

ACTION




**Action on trigger** ▶ Section 6.18
Performing a specified action each time a trigger occurs.

**Action on stop** ▶ Section 6.18
Performing a specified action each time a trigger occurs.

**Action**
Select the type of action to be performed each time a trigger occurs.

Sequence
Select whether to perform the action once (Single) or the number of times specified by ACQ Count menu (Continue).

ACQ count
Displayed only when Sequence is set to Continue. Set the number of times to carry out the action.

## Note

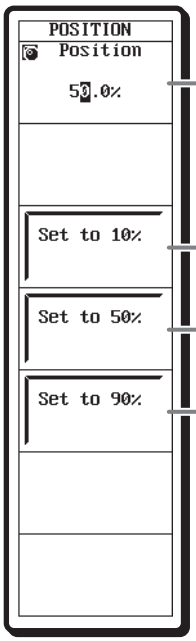
**Action Types**

- **Print the screen image data (PRINT)**
  Prints the screen image data to a specified printer.
- **Save the screen image data (Image)**
  Saves the screen image data to the save destination specified in the IMAGE SAVE menu.
- **Save the waveform data (Save to File)**
  Saves the waveform data in binary, ASCII, or floating format to the save destination specified in the FILE menu.
- **Buzzer**
  Sounds a buzzer.
- **Send Mail**
  Sends an e-mail message to a specified address. (/C10 option)

# POSITION (DELAY)

POSITION

DELAY




**Trigger position** ▶ Section 6.2
Set the trigger position with respect to the display record length in terms of a percentage (0 to 100%).

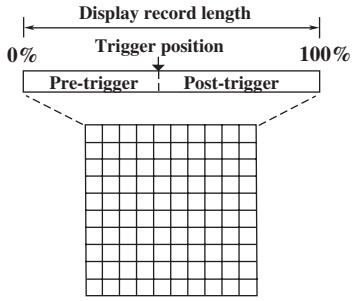
To the 10% position
Set the trigger position to the 10% position of the display record length.

To the 50% position
Set the trigger position to the 50% position of the display record length.

To the 90% position
Set the trigger position to the 90% position of the display record length.

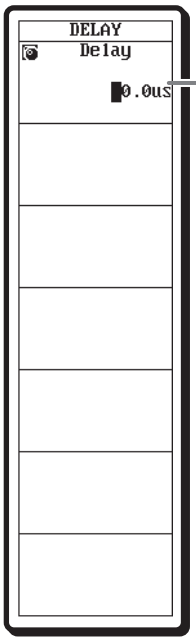
**Note**

**Trigger Position**




SHIFT + POSITION

DELAY

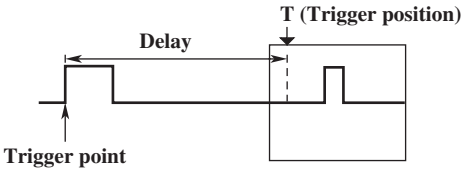



**Trigger delay** ▶ Section 6.3
Set the delay time used to display the waveform a specified time after the trigger is activated.

**Note**

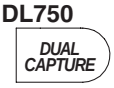
**Trigger Delay**

Set the delay time shown in the figure below.

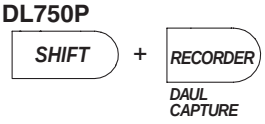


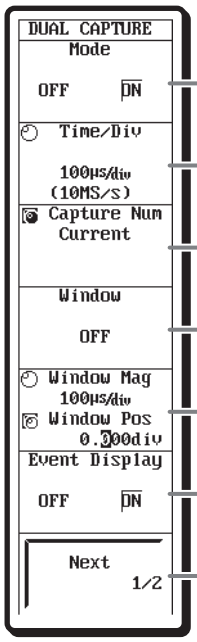
# DUAL CAPTURE

**DL750**




**DL750P**




**Turn ON/OFF dual capture** ▶Section 7.6

**Time/div of the sub waveform**

**Specify the acquisition waveform number**

Specify the number of the sub waveform you wish to display.

**Sub waveform display frame size and display position**

Select the display frame size of sub waveforms and the display position of the 1/4-sized display frame.

**Expand/reduce the sub waveform along the time axis**

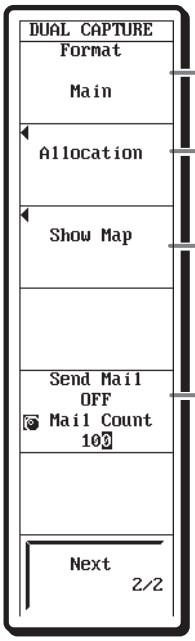
Expand/reduce the sub waveform along the time axis.

**Time axis position of the sub waveform**

Move the sub waveform along the time axis.

**Turn ON/OFF the event waveform display**

The times when triggers are activated can be displayed as event waveforms. The event waveform display can be turned ON/OFF.




Display format of sub waveforms

Set the display format of sub waveforms. Select Main (same as the main window), Single (no division), Dual (two divisions), Trial (three divisions), Quad (four divisions), Octal (eight divisions), or Hexadecimal (16 divisions).

Select the displayed waveform

Select the waveform to be displayed on the sub waveform window.

**List the sub waveforms**

Displays a list of sub waveforms. The list can be displayed by selecting waveforms.

Send mail

Sends an e-mail when a sub waveform is acquired.

## Note

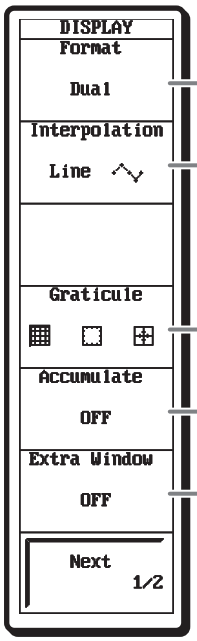
**Conditions That Allow Dual Capture**

Dual capture is possible when all of the following conditions are met.

- Time/div of the main waveform
  100 ms/div to 3 day/div (roll mode display)
- Sample rate of the main waveform: 100 kS/s or less
- (Sample rate of the main waveform) > (Sample rate of the sub waveform)
- Trigger mode is set to Auto or Log

# DISPLAY (X-Y)

DISPLAY
X-Y



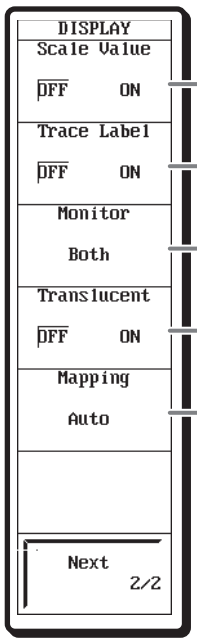

**Display format** ▶ Section 8.1
Sets the number of divided windows for displaying waveforms. Select from Single (no divisions), Dual, Triad, Quad, Octal, and Hexadecimal.

**Display interpolation** ▶ Section 8.2
In areas where less than 1000 points of data exist in the 10 divisions along the time axis (referred to as interpolation areas), a continuous waveform cannot be displayed because there is not enough sampled points. In this case, waveform is displayed by interpolating between data points. Select from linear interpolation, sine interpolation, and interpolation OFF.

Graticule ▶ Section 8.3
Select the graticule display format from three types according to your application.

Accumulate ▶ Section 8.4
Select Persist to hold each waveform on the screen for a time that is longer than the update cycle, so that newer waveforms appear overlapped on older waveforms.

Turn ON/OFF the extra window
▶ See section 8.11
Turn ON/OFF the area that displays data such as cursor measurement values and automated measurement values of waveform parameters.




Turn ON/OFF the scale values ▶Section 8.9
Turn ON/OFF the display of the scale values of the vertical and horizontal axes of each channel.

Turn ON/OFF the waveform label
▶ Section 8.10
Turn ON/OFF the display of waveform labels.

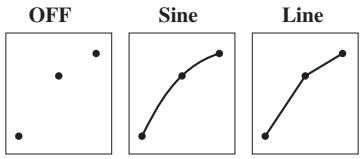
Level indicator and numeric value display
▶ Section 8.12
Turn ON/OFF the level indicator, which is a level marker displayed to the right of the waveform display frame for each waveform, and the display of the measured values (numeric values) of each channel in roll mode.

Turn ON/OFF the translucent mode display
▶ Section 8.8
Select ON to set the pop-up menu to translucent display.

Waveform mapping ▶Section 8.1
Set the mapping method of the input channels on the divided windows. Select from Auto, Fixed (in order by number), and User (arbitrary).

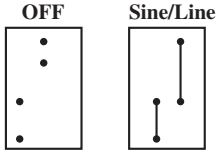
## Note

**Interpolation When the Area Is an Interpolation Area**



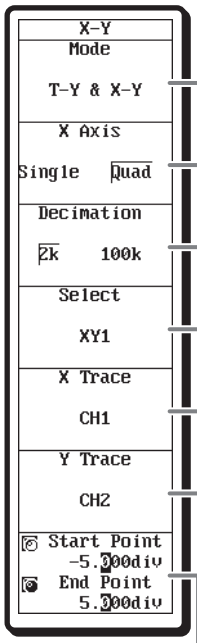

**Interpolation When the Area Is not an Interpolation Area**

If the number of data points is greater than or equal to 2002, P-P compression is performed (maximum and minimum values are determined at certain intervals), and two points are displayed on a single vertical line (1 raster).



SHIFT + DISPLAY (X-Y)

- The following figure shows the menu that appears when the waveform display format is set to T-Y&X-Y.




**Waveform display format** ▶Section 8.6
Select from T-Y&X-Y (both normal waveforms and X-Y waveforms), X-Y (only X-Y waveforms), and T-Y (only T-Y waveforms).

X-axis mode
Select Single in which the X axis is set to a common trace, and the Y axis displays all the waveforms whose display are turned ON or Quad in which the X axis trace and Y axis trace are set individually for XY1 to XY4.

Number of data points used to display waveforms
Select the number of dots when interpolation is OFF from 2 k points or 100 k points.

Select the XY axis
Select the axis to be set from XY1 to XY4.

Select the X-axis channel
Select the channel to be assigned to the X-axis.

Select the Y-axis channel
Select the channel to be assigned to the Y-axis.

X-Y waveform display range
Set the X-Y waveform display range using the Y-axis range (–5 to +5 div) of the T-Y waveform display.

## Note

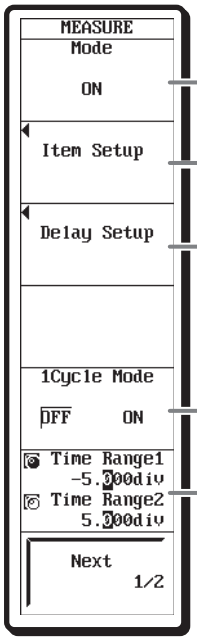
**Notes When Displaying X-Y Waveforms**

- The divided windows of the T-Y waveform display when using the T-Y & X-Y mode are displayed according to Format in the DISPLAY menu.
- The zoom function applies only to T-Y waveforms. In addition, Main, Z1, or Z2 can be selected for the T-Y waveform.
- To expand the X-Y waveform, change Upper and Lower settings or V Zoom of each channel. The displayed waveform can be enlarged/reduced.
- To change the display position of the X-Y waveform, change the position of each channel. (For voltage input)
- X-Y waveform is not displayed when the horizontal axis of a waveform trace is in units of time and the horizontal axis of another waveform trace is in units of frequency.
- Logic waveforms and event waveforms are not applicable to X-Y waveform display.
- When using the dual capture function, X-Y display and T-Y&X-Y display are not possible.

# MEASURE (GO/NO-GO)

MEASURE
GO/NO-GO

• The following figure shows the menu when the mode is set to ON (automated measurement of waveform parameters).



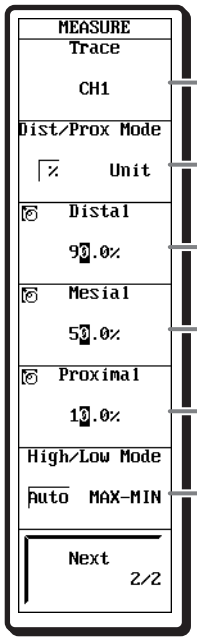

**Turn ON/OFF the automated measurement of waveform parameters**
▶ Section 11.6
Select ON when performing automated measurement of waveform parameters.

**Measurement parameters**
Select the measurement parameter to be automatically measured and the target waveform.

Delay
Enter settings related to the delay measurement between channels.

Turn ON/OFF 1 cycle mode
Select whether to compute items related to the voltage axis or area within the period determined in measurements such as Rms and Avg.

**Measurement range**
Set the time axis range for performing the automated measurement of waveform parameters.




Target waveform for distal, mesial, and proximal
Select the waveform used to determine the values of distal, mesial, and proximal that act as references to the automated measurement of waveform parameters.

Distal, mesial, and proximal unit
Select % or voltage/temperature.

Distal value
Set the distal value in terms of a percentage or voltage/temperature.

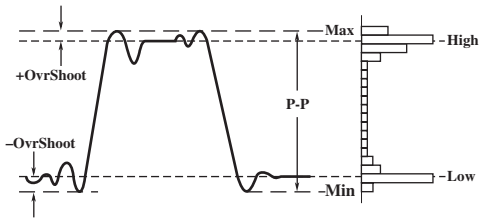
Mesial value
Set the mesial value in terms of a percentage or voltage/temperature.

Proximal value
Set the proximal value in terms of a percentage or voltage/temperature.

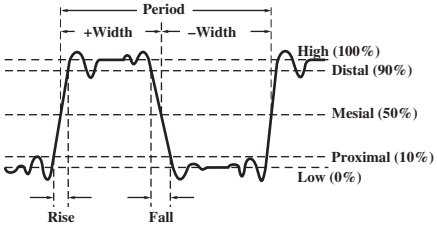
High/Low level
Select the method of setting the high and low levels. Select Auto which sets the level of higher amplitude to high and the level of lower amplitude to low or MAX-MIN which sets the maximum value to high and minimum value to low.

## Note

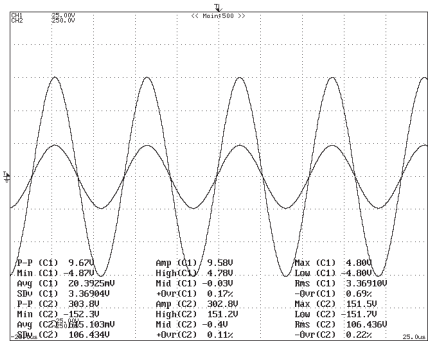
**Voltage-Axis Parameters**



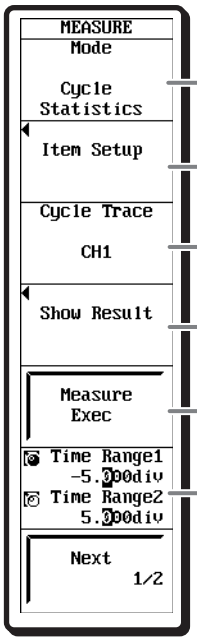

**Time-Axis Parameters**




**Display Example of Automated Measurement**



• The following figure shows the menu when the mode is set to Cycle Statistics.




**Statistical processing mode**
▶ Section 11.7
Select Statistics for normal statistical processing, Cycle Statistics for cycle statistical processing, or History Statistics for statistical processing of history data.

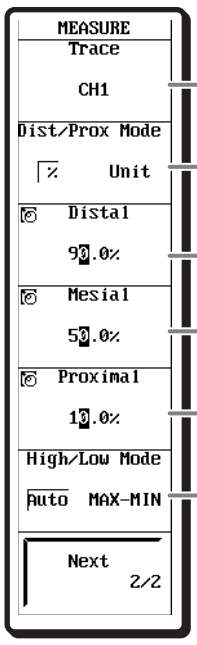
**Measurement parameters**
Select the measurement parameter on which to perform cycle statistical processing and the target waveform.

Cycle trace[1]
Select the target waveform of the cycle (cycle determined automatically for the displayed waveform).

List of results[2]
Displays a list of measured results of the selected automated measurement parameters.

**Execute cycle statistical processing[3]**

**Measurement range**
Set the time range for performing cycle statistical processing.




Target waveform for distal, mesial, and proximal
Select the waveform used to determine the values of distal, mesial, and proximal that act as references to the automated measurement of waveform parameters.

Distal, mesial, and proximal unit
Select % or voltage/temperature.

Distal value
Set the distal value in terms of a percentage or voltage/temperature.

Medial value
Set the mesial value in terms of a percentage or voltage/temperature.

Proximal value
Set the proximal value in terms of a percentage or voltage/temperature.

High/Low level
Select the method of setting the high and low levels. Select Auto which sets the level of higher amplitude to high and the level of lower amplitude to low or MAX-MIN which sets the maximum value to high and minimum value to low.

## Note

**Statistical Processing**

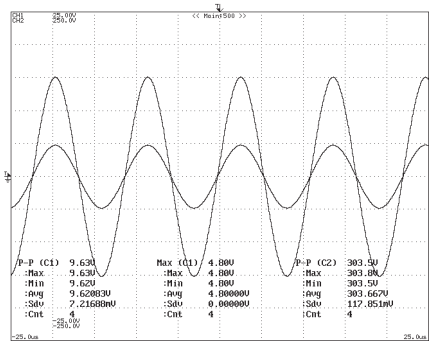
Statistical processing is performed on the values obtained by the automated measurement of waveform parameters. The following five statistics are determined on the three measured values of automated measurement parameters.

- Max: Maximum value
- Min: Minimum value
- Avg: Average value
- Sdv: Standard deviation
- Cnt: Number of automated measurement values used in the statistical processing

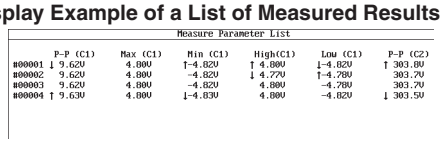
The following three statistical processing modes are available.

- **Normal statistical processing**
  Statistical processing is performed on all acquired waveforms while acquiring waveforms.
- **Cycle statistical processing**
  Performs automated measurement of waveform parameters per waveform cycle within the specified measurement range.
- **Statistical processing of history data**
  Performs automated measurement of waveform parameters on the waveform that is acquired using the history memory function and performs statistical processing. Statistical processing is performed from the oldest waveform.

**Display Example of Statistical Processing Results**



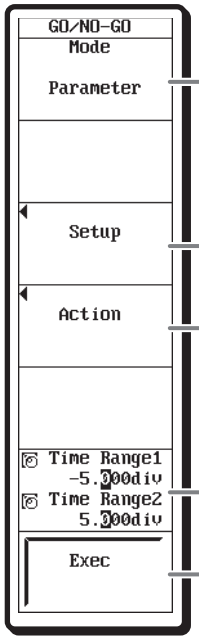
**Display Example of a List of Measured Results**




1. When performing normal statistical processing or statistical processing of history data, a menu related to the delay measurement between channels appears.
2. When performing normal statistical processing, this menu does not appear.
3. When performing normal statistical processing, a menu related to 1 cycle mode appears.

SHIFT + MEASURE
GO/NO-GO

- The following figure shows the menu that appears when the GO/NO-GO determination mode is set to the measured values of waveform parameters.




**GO/NO-GO determination mode**
▶ Section 11.8
Select the measured values of waveform parameters (Parameter).

**Determination condition**
Set the target waveform, determination criteria, parameter, upper and lower limits of the parameter, action conditions, etc.

**Action after determination**
Select printing of the screen image (PRINT), saving of the screen image data (Image), saving of the waveform data (Save to File), beep sound (Buzzer), or mail transmission (Send Mail).

**Determination range**
Set the determination start point and determination end point when limiting the range along the time axis where determination is performed.

**Execute the determination**

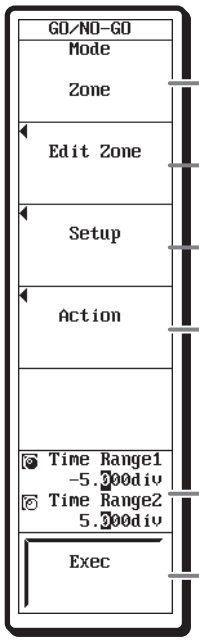
**Note**

**Types of GO/NO-GO Determination Mode**

This function is useful when you want to inspect signals and track down abnormal symptoms on a production line making electronic equipment. The function determines whether the waveform is within the preset range and performs a predetermined action when the decision is GO (or NO-GO). There are two types of determinations.

- **Parameter**
  By setting the upper/lower limits of the automated measurement of waveform parameters, GO/NO-GO determination is performed on whether the measured value enters the range or exits the range.
- **Zone**
  GO/NO-GO is determined by creating a zone based on a reference waveform and checking whether or not the waveform has left or entered the zone.

- The following figure shows the menu that appears when the GO/NO-GO determination mode is set to waveform zone.




**GO/NO-GO determination mode**
▶ Section 11.9
Select the waveform zone (Zone).

**Creating the determination zone**
Select the basic waveform, create/edit the determination zone, and register zones.

**Determination condition**
Set the target waveform, determination criteria, zone number, determination logic, action condition, etc.

**Action after determination**
Select printing of the screen image (PRINT), saving of the screen image data (Image), saving of the waveform data (Save to File), beep sound (Buzzer), or mail transmission (Send Mail).

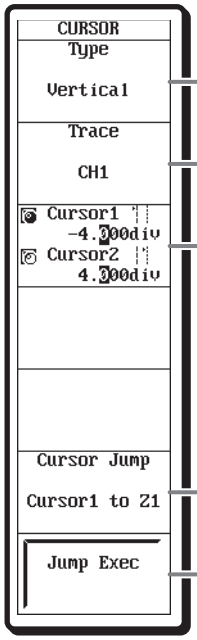
**Determination range**
Set the determination start point and determination end point when limiting the range along the time axis where determination is performed.

**Execute the determination**

# CURSOR

CURSOR

- The following figure shows the menu that appears when the cursor type is set to V cursor.




**Cursor type** ▶ Section 11.5
Select from H cursor, V cursor, H&V cursor, marker cursor, and angle cursor.

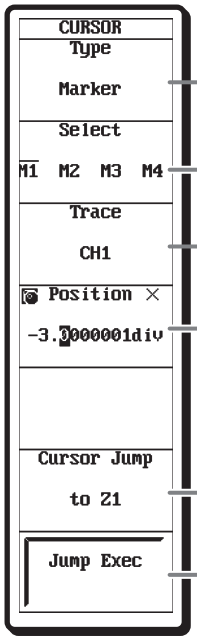
**Target waveform**
Select the target waveform for cursor measurement.

**Move the cursor**
Set the position of the two vertical cursor.

Cursor jump
Select the type of jump when jumping the cursor.

Execute cursor jump

- The following figure shows the menu that appears when the cursor type is set to marker cursor.




**Cursor type** ▶ Section 11.5
Select from H cursor, V cursor, H&V cursor, marker cursor, and angle cursor.

**Select the marker**
Select the marker to be moved.

**Target waveform**
Select the target waveform for cursor measurement.

**Move the marker**
Set the marker position. The icon of the target marker appears in the top right section.

Jump the marker
Select the type of jump when jumping the marker.

Execute the marker jump

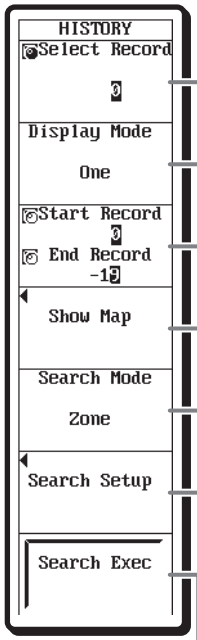
## Note

**Cursor Types**

- **H (Horizontal) cursors**
  Two broken lines (H cursors) are displayed on the X-axis (horizontal axis). The voltage of each H cursor and the voltage difference between the H cursors are measured.
- **V (Vertical) cursors**
  Two broken lines (V cursors) are displayed on the Y-axis (vertical axis). The time from the trigger position to each V cursor and the time difference between the V cursors are measured. The voltage value of the signal at each cursor position, and the voltage difference between the cursors are also measured.
- **H&V cursors**
  H cursors and V cursors are displayed simultaneously.
- **Marker cursors**
  Four markers are displayed on the specified waveform. The voltage and the time from the trigger position of each marker as well as the voltage difference and time difference between markers are measured.
- **Angle (Degree) cursor**
  Measures the angle between two angle cursors with respect to a reference angle corresponding to the width between the zero point and the end point, which are measurement references.

# HISTORY

HISTORY




**Select the displayed waveform**
▶ Section 11.1
Specify the waveform data to be displayed from the waveform data stored in the history memory.

**Waveform display format** ▶ Section 11.1
Select the display format of the waveform data from One, All, and Ave.

**Start record/End record** ▶ Section 11.1
Set the target range for the case when the waveform display format is set to All or Ave.

**History map list** ▶ Section 11.1
Lists the number of the waveform data stored in the history memory and the time at acquisition end.

Select the search mode
▶ Sections 11.2 and 11.3
Select the method for searching waveforms that meet the specified conditions among the waveforms saved in the history memory.
OFF: Does not search.
Zone: Searches for waveforms that passed or not passed through a specified zone.
Parameter: Searches for waveforms of which the specified waveform parameter exceeded or stayed within a specified range.

History search conditions ▶ Section 11.2
When search mode is Zone
Set the search zone, search source channel, search condition, and search range.
When search mode is Parameter
Set the search parameter, search source channel and parameter, search condition, and search range.

**Execute the history search**
▶ Section 11.2

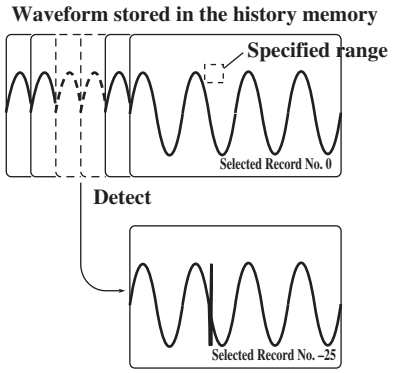
## Note

**Waveform Display Format**

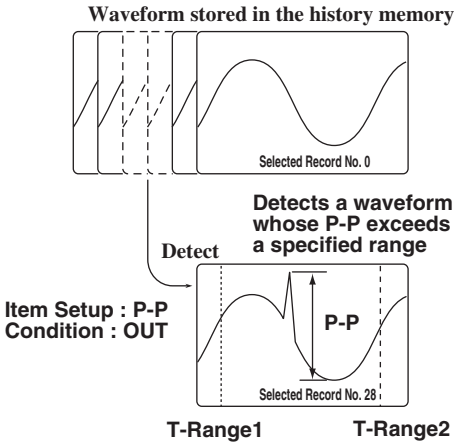
- **One**
  Displays the waveform specified by Select Record among the waveforms in the range specified by Start Record and End Record.
- **All**
  Displays all the waveforms in the range specified by Start Record and End Record overlapped.
- **Ave**
  Displays the average waveform of the waveforms in the range specified by Start Record and End Record.

**History Search**

**Zone**




**Parameter**



# MATH

MATH

**Turn ON/OFF the computation function**
▶Chapter 10

**Set computation**
Define the computation and set the computation target channel, scaling, unit, label, and ON/OFF of Math waveforms.

Number of FFT points
Select the number of points used in performing the FFT from 1000 (1 k), 2000 (2 k), 5000 (5 k), 10000 (10 k), 20000 (20 k), 50000 (50 k), and 100000 (100 k).

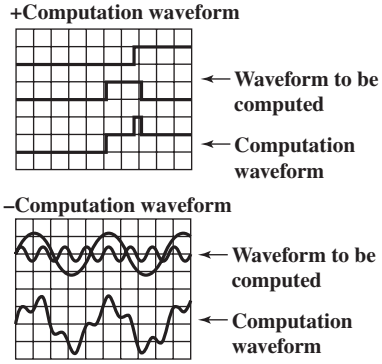
**Computation range**
Set the computation start and end points along the time axis.

**Execute the computation**

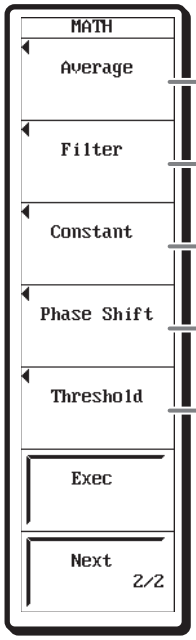
Displayed only on models with the user-defined computation option (/G2 option).

**Note**

**Waveform Computation Example**




- The following figure shows the menu that appears only on models with the user-defined computation option (/G2 option).




Average and peak computation
Averaging and peak computation can be performed on the computed data. Select from linear average, exponential average, cycle average, and peak computation.

Digital filter
Select from Gauss, Sharp, and IIR (Butterworth).

Constant
Set constants to be used in the expression.

Shift computation
Set the amount of phase shift for the case when SHIFT is specified in the equation.

Threshold level
Set the threshold level for binary computation.

**Note**

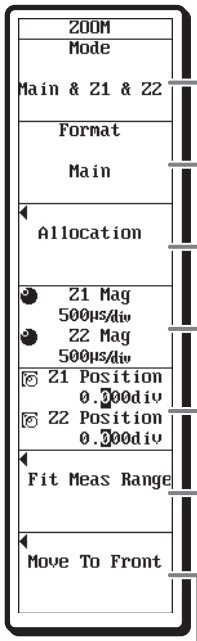
**Averaging and Peak Computation**

- **Linear averaging**
  The values are summed linearly the number of average counts (the number of acquisitions, 2 to 128, $2^n$ steps) and divided by the average count. The resultant waveform is displayed.
- **Exponential averaging**
  The average is determined by attenuating the effects of past data according to the specified attenuation constant (2 to 256, in $2^n$ steps). The resultant waveform is displayed.
- **Cycle averaging**
  Divides one period of computed data into the specified number of data points (Cycle Count). This is done across multiple periods of data from the start to the end position of the computation. Then, the average of the data points at the same position across multiple periods is determined. The resulting waveform is displayed.
- **Peak computation**
  Determines the maximum value at each point of the computed data and displays the waveform. For every computation, the new computed value is compared to the past value and the larger one is displayed.

# ZOOM (SEARCH)

ZOOM
SEARCH

• The following figure shows the menu that appears when the display mode of zoomed waveform is set to Main&Z1&Z2.




**Select the display mode of zoomed waveforms** ▶Section 8.5
Select how the normal waveforms and two zoomed waveforms (Z1 and Z2) are displayed.

Display format of zoomed waveforms
Sets the number of divided windows for displaying waveforms. Select from Single (no divisions), Dual, Triad, Quad, Octal, and Hexadecimal.

Select the trace to zoom on
Only the waveforms that are turned ON can be zoomed on.

**Zoom rate**
Set the zoom rate (T/div) of the Z1 and Z2 zoom displays.

**Zoom position**
Set the zoom position by specifying the zoom center position (center of the zoom box) in the range –5 to +5 divisions with the center of the waveform display frame set to 0 divisions.

Change the range of the automated measurement of waveform parameters
Set the range of the automated measurement of waveform parameters to the zoom range of Z1 or Z2.

Move the zoom box to the newest position of the waveform
Moves the zoom box of Z1 or Z2 to the newest position (right end) of the main waveform. This is useful when displaying the newest waveform expanded in roll mode.

## Note

**Selecting the Display Mode of Zoomed Waveforms**

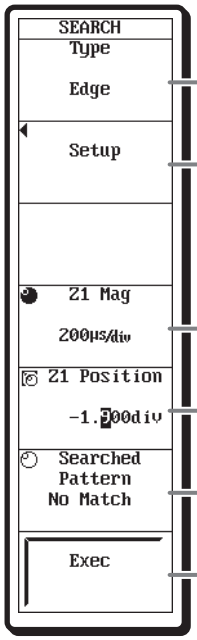
Select from the following:

- **Main**
  Displays only the main (unzoomed) waveform.
- **Z1 Only**
  Displays only the zoomed waveform of zoom box Z1.
- **Z2 Only**
  Displays only the zoomed waveform of zoom box Z2.
- **Main&Z1**
  Displays the main waveform in the top window and zoomed waveform of zoom box Z1 in the bottom window.
- **Main&Z2**
  Displays the main waveform in the top window and zoomed waveform of zoom box Z2 in the bottom window.
- **Z1&Z2**
  Displays the zoomed waveform of zoom box Z1 in the top window and the zoomed waveform of zoom box Z2 in the bottom window.
- **Main&Z1&Z2**
  Displays the main waveform in the top window, the zoomed waveform of zoom box Z1 in the lower left window and the zoomed waveform of zoom box Z2 in the lower right window.

## ZOOM (SEARCH)

SHIFT + ZOOM
SEARCH

- The following figure shows the menu that appears when the search type is set to Edge.




**Select the search type** ▶Section 11.4
Select edge search in which search is performed on the number of times the waveform goes above a specified level (rising) or the number of times the waveform goes below a specified level (falling) from the search start point.

**Edge search condition**
Set the search source waveform, search start point, level, search count, etc.

**Zoom rate**
Set the zoom rate (T/div) of the Z1 and Z2 zoom displays.

**Zoom position**
Set the zoom position by specifying the zoom center position (center of the zoom box) in the range –5 to +5 divisions with the center of the waveform display frame set to 0 divisions.

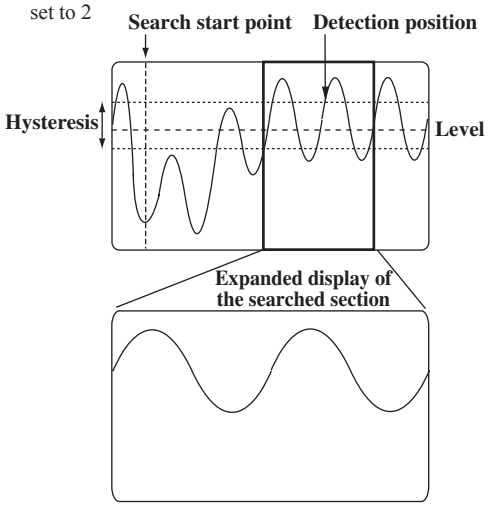
Display of past search results
Specify the number of the search result to be displayed.

**Execute the search**

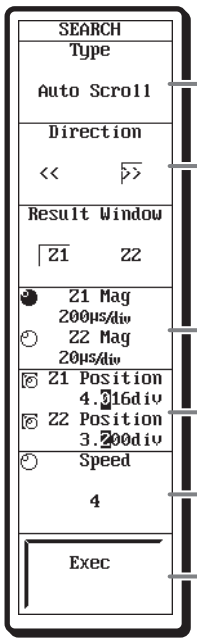
**Note**

**Edge Search**

Example when the edge is set to rising and the count is set to 2




- The following figure shows the menu that appears when the search type is set to Auto Scroll.




**Select the search type** ▶Section 11.4
Select auto scroll in which search is performed by automatically moving the zoom position in the specified direction.

**Select the scroll direction**
Select the scroll direction, left or right.

Zoom rate
Set the zoom rate (T/div) of the Z1 and Z2 zoom displays.

Zoom position
Set the zoom position by specifying the zoom center position (center of the zoom box) in the range –5 to +5 divisions with the center of the waveform display frame set to 0 divisions.

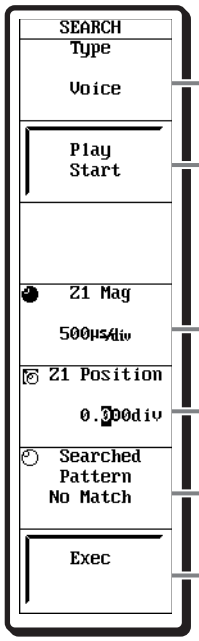
**Scroll speed**
Select from 10 speed levels from 1 to 10.

**Execute the search**

### ZOOM (SEARCH)

SHIFT + ZOOM
SEARCH

- The following figure shows the menu that appears when the search type is set to Voice.




**Select the search type** ▶ Section 11.4
Select voice search in which search is performed on the start section of the voice memo recording (rising edge of the voice bit of the event waveform).

**Play the voice memo that is found**
Set the search source waveform, search start point, level, search count, etc.

**Zoom rate**
Set the zoom rate (T/div) of the Z1 and Z2 zoom displays.

**Zoom position**
Set the zoom position by specifying the zoom center position (center of the zoom box) in the range –5 to +5 divisions with the center of the waveform display frame set to 0 divisions.

Display of past search results
Specify the number of the search result to be displayed.

**Execute the search**

**Note**

**Playing the Voice Memo That Is Found**

When using the voice search function, the voice memo that has been found can be played by pressing the Play Start soft key. The voice memo can be played only when the searched item is the newest waveform that has been acquired to the acquisition memory. While the voice memo is being played, Play Start indication changes to Play Stop. To stop the voice memo that is playing, press the Play Stop soft key. When the voice memo is finished playing, the Play Stop indication automatically changes to Play Start even if the Play Stop soft key is not pressed.

# VOICE MEMO

DL750: VOICE MEMO

DL750P: SHIFT + FEED (VOICE MEMO)

**Turn ON/OFF voice memo[1]** ▶ Section 7.9

**Voice number**
Specify the voice number of the voice memo you wish to play.

**Start playing**
Start playing the voice memo specified by the voice number.

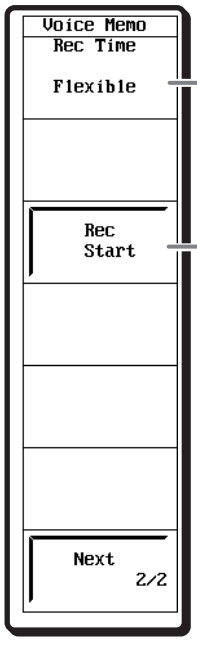
**Turn ON/OFF the event waveform display**
The record interval of the voice memo can be displayed as event waveforms. The event waveform display can be turned ON/OFF.

**Erase voice memo**
Erase the recorded voice memo.

**Note**

**Playing of the Voice Memo**

Use Voice Number to specify the number of the voice memo you wish to play. Current indicates the newest voice memo. The oldest memo is indicated as #1. The voice memo is newer as the number gets larger. The date/time displayed below Voice Number is the date/time when the voice memo recording was started.




**Record time**
Select the method of setting the record time from Flexible and Fixed. If you select Fixed, specify Time to select the record time and record count.

**Execute recording**
Press this soft key or press the PUSH switch on the earphone microphone to start recording.

**Note**

**Record Time**

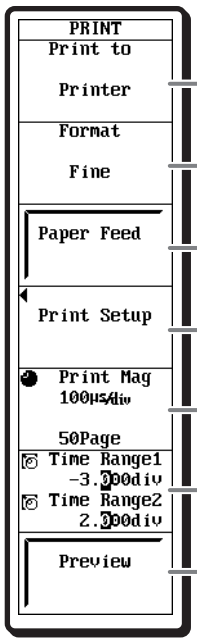
- **Flexible**
  Recording can be made multiple times for an arbitrary length of time (the record time is not specified). Recording continues while the PUSH switch on the earphone microphone is held down or from the time when the Rec Start soft key is pressed until the Rec Stop soft key is pressed. Recording is possible up to a total of 100 s.
- **Fixed**
  Recording can made for the selected time and count. The combinations of the time and count can be selected from the following: 5 s * 20, 10 s * 10, 20 s * 5, 25 s * 4, 50 s * 2, and 100 s * 1
  Once the PUSH switch on the earphone microphone or the Rec Start soft key is pressed, recording is performed for the specified length of time. The PUSH switch does not have to be held down.

1. In addition to the voice memo function, a voice comment function is available that allows voice comments to be attached to screen image data. For details on the voice comment function, see section 13.19 in the DL750/DL750P User's Manual Part 2.

# PRINT

SHIFT + PRINT (MENU)

- The following figure shows the menu that appears only when the print destination is set to the built-in printer and the output format is set to fine print.




**Print destination** ▶ Sections 12.1 and 12.2
Select the print destination of the screen image from built-in printer, USB printer, network printer, and PDF (DL750P only).

**Output format**
Select the output format from (1) normal size print, (2) fine print in which a specified range is expanded and printed, (3) zoom print in which zoom box Z2 of the zoom function is expanded and printed (Zoom Print), and (4) A4 Print in which the display range is expanded to A4 size and printed.

Execute paper feeding

**Print setting (Comment on the DL750)**
Set the print format, graticule, detailed information, comment, etc.

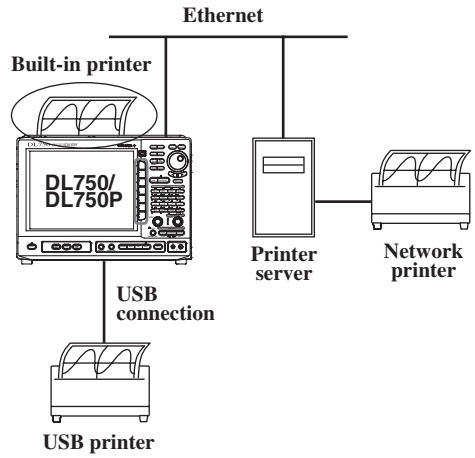
**Magnification**
Set the magnification of the specified print range (see the next item).

**Print range**
Set the range along the time axis to be printed.

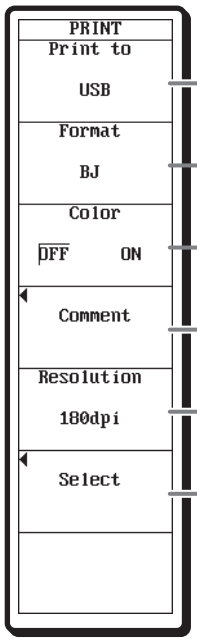
**Preview**
Displays a preview of the print image.

**Note**

**Printing the Screen Image**




- The following figure shows the menu that appears only when the print destination is set to the USB printer.




**Print destination** ▶ Section 12.3
Select the print destination of the screen image from built-in printer, USB printer, network printer, and PDF (DL750P only).

**Output format**
Select the output format of the USB printer from ESC-P, ESC-P2, LIPS3, PCL5, and BJ.

Turn ON/OFF color printing

Comment
Set the comment characters to be printed at the bottom section.

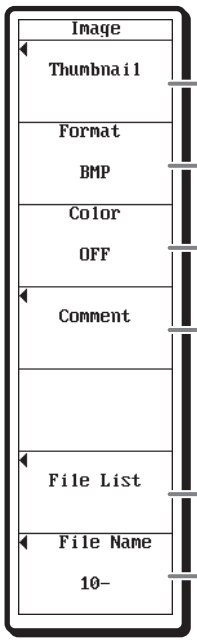
Output resolution for BJ printers
(when the output format is set to BJ)
Select from 180 dpi, 300 dpi, 360 dpi, and 600 dpi.

Confirm the connected USB printer

# IMAGE SAVE

SHIFT + IMAGE SAVE

MENU




**Thumbnail list** ▶ Section 13.12
Lists the thumbnails of the stored screen images.

**Output format** ▶ Section 13.11
Select the storage format of the screen image data from PNG, JPEG, BMP, and PostScript.

**Color** ▶ Section 13.11
Select the coloring used when the screen image data is saved from color, color (white background), grayscale, and black & white.

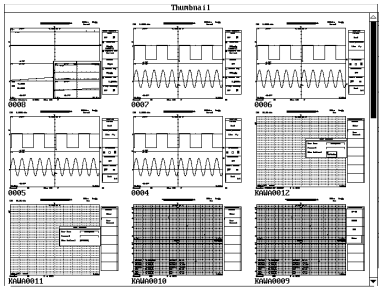
**Comment** ▶ Section 13.11
Set the comment characters that can be added to the bottom section of the screen and saved.

**Save destination** ▶ Section 13.11
The drive names of the possible storage medium are displayed on the File List. Set the save destination drive and directory. To execute the save operation, press only the IMAGE SAVE key.

**File name** ▶ Section 13.11
Set the file name. Auto naming using numbers and date/time is possible.

## Note

**Example of Thumbnails of the Stored Screen Image**



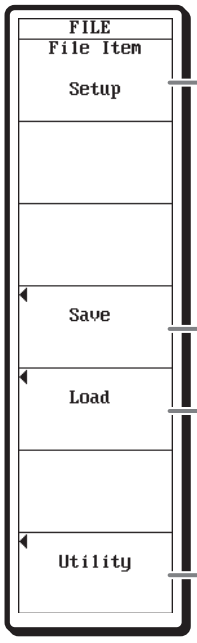
**Drive Name of the Storage Medium**

| | |
|---|---|
| **[FD]:** | Floppy disk |
| **[ZIP]:** | Zip disk (DL750 only) |
| **[PC Card]:** | PC card |
| **[HD]:** | Hard disk |
| **[HD-1]:** | Partition 1 on the hard disk |
| **[SCSI5]:** | SCSI device with the ID number set to 5 |
| **[SCSI5-1]:** | Partition 1 of a SCSI device whose ID number is 5 |
| **[NetWork]:** | Network drive |
| **[USB]:** | USB storage[1] |

1. Only on models supporting USB storage devices (see section 13.3 in the User's Manual Part 2)

# FILE

FILE




**Target data** ▶ Sections 13.7 to 13.17
Select the data to be saved or loaded. Select from setup data, waveform data, snapshot waveform data, waveform parameters of automated measurement, and screen image data.

**Save** ▶ Sections 13.7 to 13.10, and 13.14
Set the data to be saved, save method, save destination, etc. Execute the save operation.

**Load** ▶ Sections 13.7 to 13.9, and 13.14
Set the data to be loaded and execute the load operation.

**File operation** ▶ Sections 13.15 to 13.17
Delete files, copy, change the directory/file name, format the storage medium, etc.

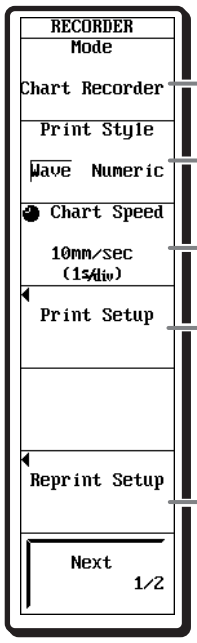
## Note

**Storage Data Format of Waveform Data (Data Type)**
Select from binary, ASCII, and 32-bit floating.

# RECORDER (Only DL750P)

RECORDER
DUAL CAPTURE

- The following figure shows the menu that appears only when the recorder mode is set to chart.



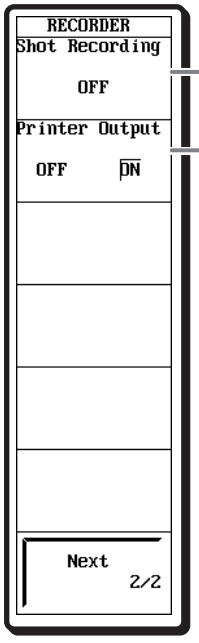

**Recorder mode** ▶ Section 9.2
Select the recorder mode to chart, X-Y, or OFF.

**Print style** ▶ Section 9.4
When Chart Recorder mode is selected, set the print style to T-Y waveform recording (Wave) or numeric value recording (Numeric).

**Chart speed** ▶ Section 9.3
Set the chart speed in the range of 10 mm/h to 20 mm/s.

**Specify the print settings** ▶ Section 9.4
Set the print format, graticule, and detailed information.

**Specify the reprint settings**
▶ Sections 9.8 and 9.9
Displays a menu used to reprint to the built-in printer or create a PDF file after T-Y recording.




**Shot recording** ▶ Section 9.3
Stops the recording when the specified length of recording is complete. Select the shot recording length from 20 cm, 50 cm, 1 m, 2 m, or OFF (do not shot record).

**Printer output** ▶ Section 9.3
Select whether to carry out T-Y recording to the built-in printer. When set to ON, data is recorded to the built-in printer and saved to the internal memory. When set to OFF, only the saving of the data to the internal memory is carried out.

## Note

**Functions that cannot be used during recorder mode**

The functions that cannot be used during Chart Recorder mode or X-Y Recorder mode are as follows:

- History memory (HISTORY)
- GO/NO-GO determination (GO/NO-GO)
- Dual capture
- Waveform computation (MATH)
- Items that are set with the ACQ or X-Y key cannot be changed.
- Data search (SHIFT+ZOOM (SEARCH)) (only during X-Y Recorder mode)

**Trigger Mode during Chart Recorder Mode**

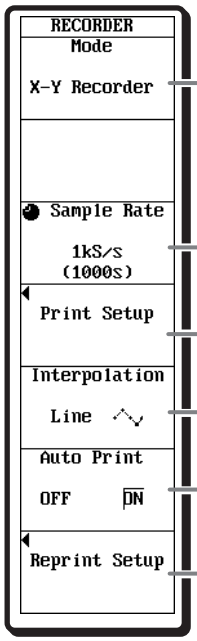
- Auto
  Starts recording simultaneously with the start of the measurement. Recording continues until the measurement is stopped.
- Log
  Starts recording simultaneously with the start of the measurement. Measurement and recording stops when the maximum number of divisions of measured values that can be saved is recorded.
- Single
  Starts recording when the trigger conditions are met after the start of the measurement. Measurement and recording stops when the maximum number of divisions of measured values that can be saved is recorded.
- Repeat
  Starts recording when the trigger conditions are met after the start of the measurement. Recording stops when the maximum number of divisions of measured values that can be saved is recorded. Then, the DL750P enters the trigger-wait state.

**Acquisition Mode during Chart Recorder Mode**

Normally, the acquisition mode in Chart Recorder mode is envelope. However, the acquisition mode can be changed from envelope to normal by using the MISC key > Others menu.

RECORDER
DUAL CAPTURE

• The following figure shows the menu that appears only when the recorder mode is set to X-Y.




**Recorder mode** ▶ Section 9.2
Select the recorder mode to chart, X-Y, or OFF.

**Sample rate** ▶ Section 9.7
Select the sample rate from 5 S/s to 5 kS/s.

**Specify the print settings** ▶ Section 9.7
Set the print format, graticule, and detailed information.

**Interpolation method** ▶ Section 9.7
Set the interpolation format to OFF or Line.

**Auto print** ▶ Section 9.7
Select whether to automatically record (print) to the built-in printer when waveform acquisition is stopped.

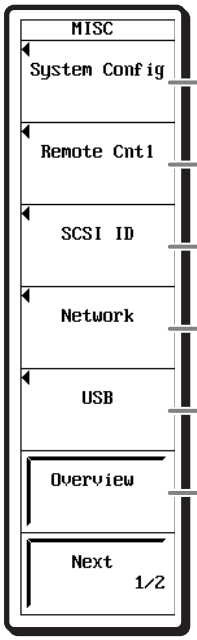
**Reprint** ▶ Section 9.7
Displays the menu that recalls data recorded immediately up to the point when waveform acquisition was stopped and reprints to the built-in printer or creates a PDF file.

**Note**

**Acquisition Mode during X-Y Recorder Mode**
The acquisition mode is automatically set to normal mode (cannot be changed) during X-Y record mode.

# MISC

## MISC




**System settings**
▶ Sections 3.5, 17.1, 17.2, and 17.4
Set the date/time, set the color and brightness of each section on the screen (Graphic Color), menu language, message language, and turn ON/OFF the click sound.

**Communication interface**[1]
Select the communication interface from GP-IB, RS-232, USB, and Network (Ethernet). When GP-IB or RS-232 is selected, required communication parameters can also be set.

**SCSI ID** ▶ Section 13.6
Set the SCSI ID number of the DL750/DL750P and the internal hard disk.

**Network** ▶ Chapter 16
Sets TCP/IP parameters that are required when connecting the DL750/DL750P to the Ethernet network.

**USB** ▶ Sections 4.2, 12.3, and 17.3
Display a list of USB devices that are connected to the DL750/DL750P or set the USB keyboard language.

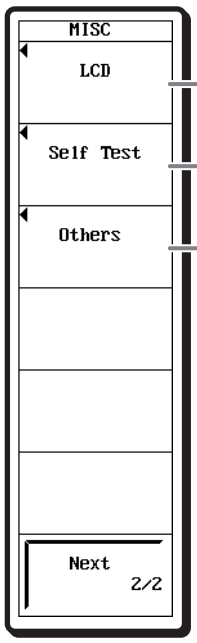
**Overview** ▶ Section 18.4
Displays the model, record length, installed module names, internal medium drive type, options, default language, software version No., etc.

**Note**

**Communications Using the Ethernet Interface**

The following operations are possible.

- Save, delete, copy waveform data, screen image data, and setup data to the FTP server on the network.
- Access the DL750/DL750P from an FTP client on the network and retrieve the files on the storage medium of the DL750/DL750P, the storage medium of an external SCSI device, or the USB storage medium.
- Print the screen image data on a network printer.
- Periodically send information such as the DL750/DL750P status or the results of GO/NO-GO determination to a specified e-mail address by mail.
- The DL750/DL750P can function as a Web server. By using the Web page of the DL750/DL750P, file transfer, monitoring of displayed waveforms, basic DL750/DL750P key control, and retrieval of waveform data are possible.




**LCD backlight** ▶ Section 17.5
Turn ON/OFF the LCD backlight and set the backlight brightness (8 levels from 0 to 7).

**Self test** ▶ Section 18.3
Perform memory, key, drive, and built-in printer tests.

**Miscellaneous**
▶ Sections 7.1, 6.18, 13.2, and 14.4
Turn ON/OFF the waveform acquisition start mode at power-on (Start Mode), turn ON/OFF the execution mode of the action-on-trigger at power-on (Action Mode), turn ON/OFF the internal hard disk motor (HDD motor), and turn ON/OFF the video signal output (Video Out).

1. For details, see the DL750/DL750P Communication Interface User's Manual.

MEMO

MEMO